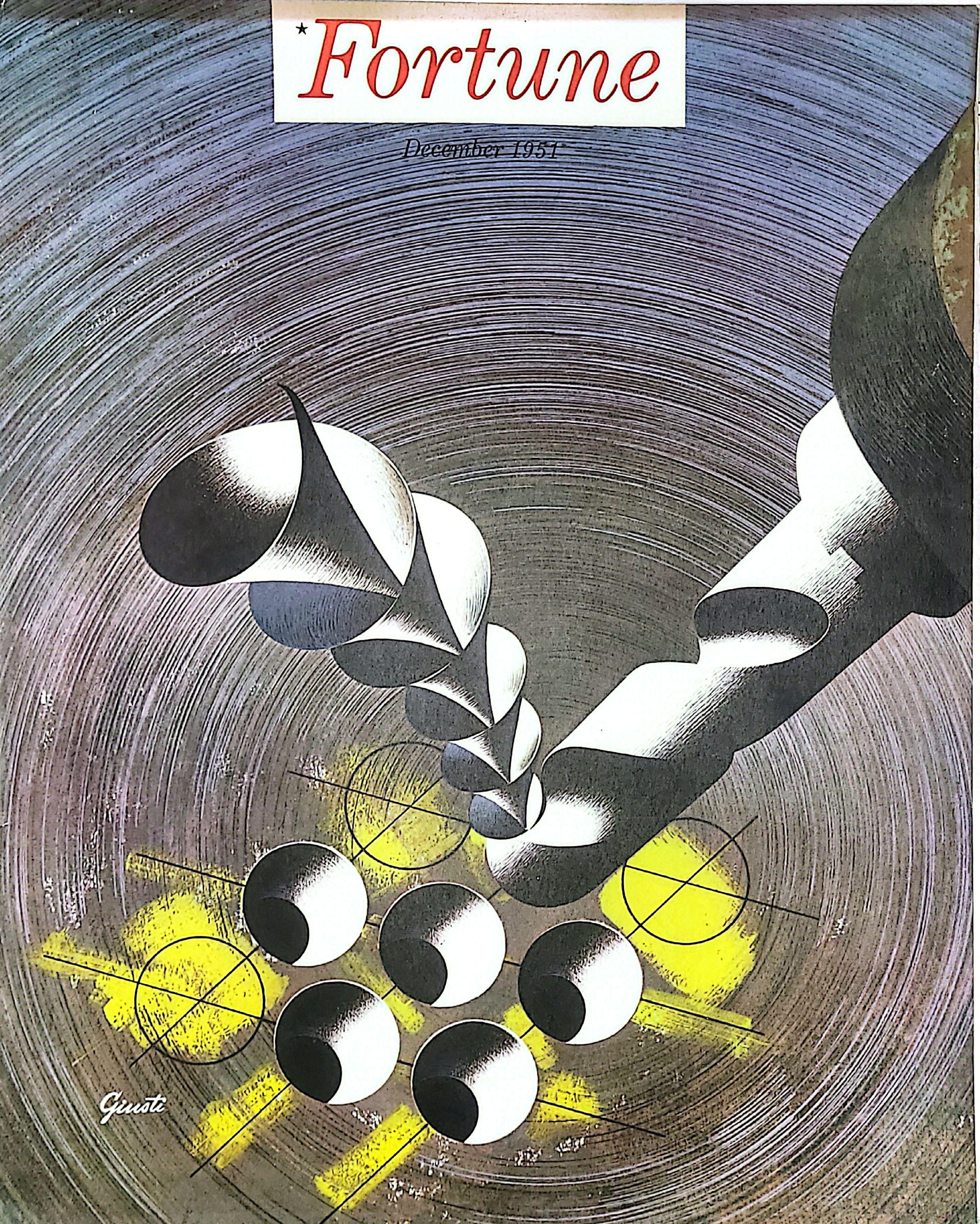
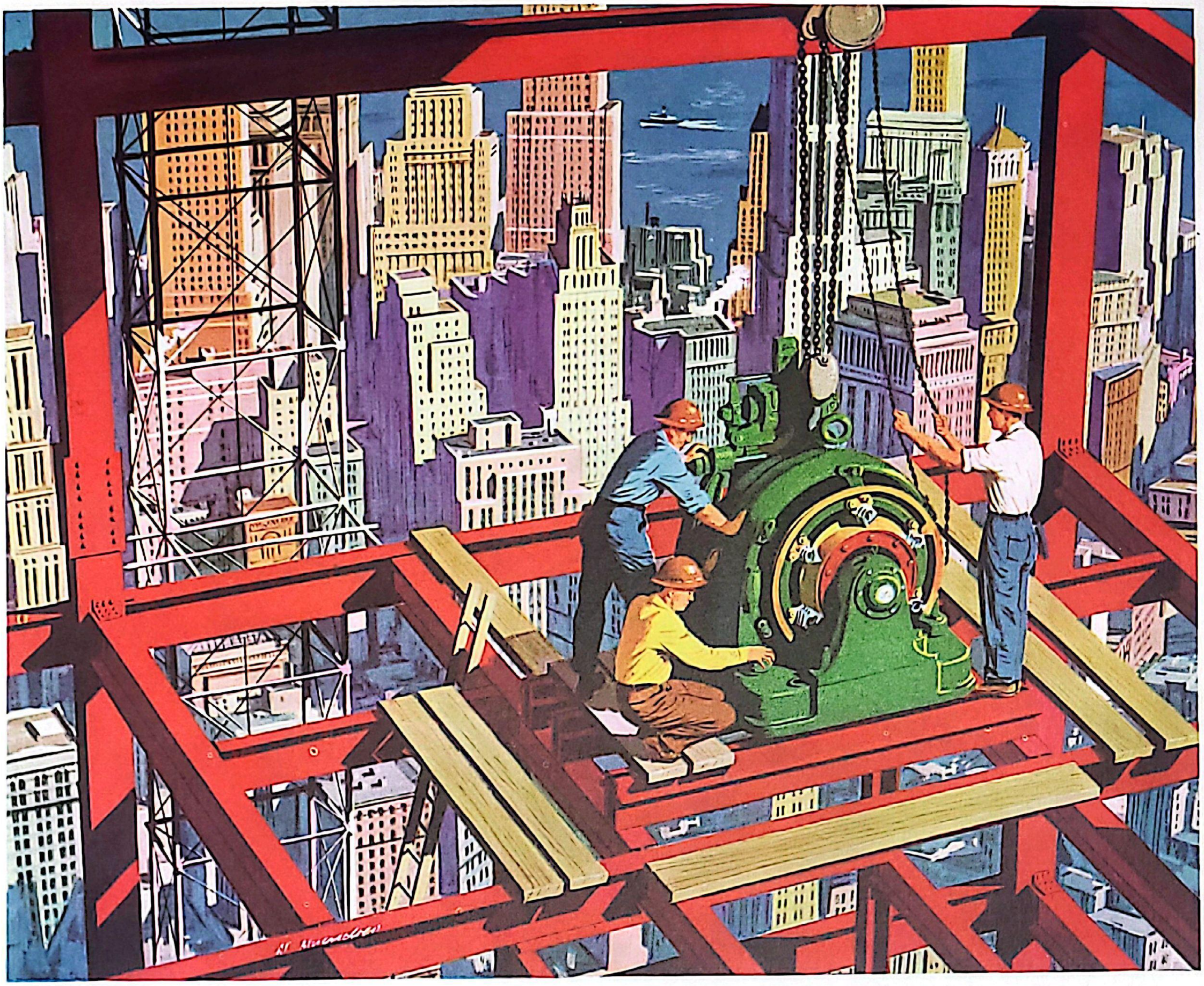
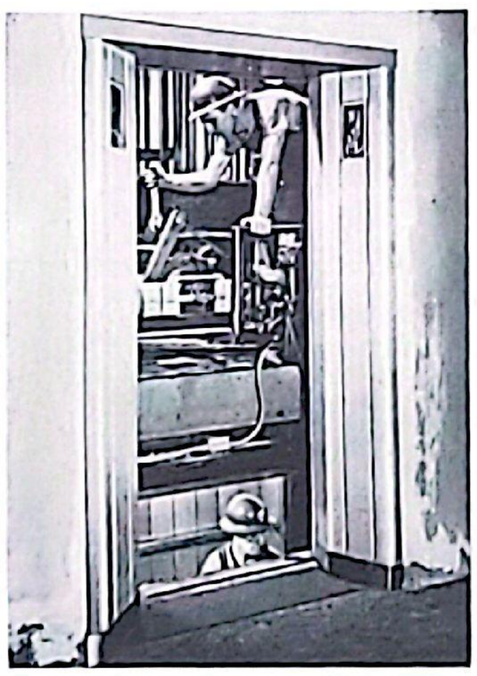
★ Fortune

December 1957







AN ELEVATOR SKILL YOU'LL NEVER MATCH

We mean elevator construction skill. Something that's acquired on open steelwork. In 2 to 80-floor hoistways. In lofty machine rooms. It calls for men with an unusual combination of skills—those of a rigger, ironworker, machinist, electrician, carpenter, sheet metal worker. Basic skills *plus* long Otis training: Studying elevator parts, assemblies, functions; construction procedures; final testing and adjusting.

Otis construction skill *delivers* the promise that forms the basis of every Otis contract—*the world's finest elevatoring!* A promise that is not considered fulfilled until Otis headquarters has approved the field engineer's final report.

You'll find that Otis construction skill is available everywhere. No job is too small, too big, too far. Some 4,000 elevator constructors and helpers and 100 elevator field engineers are on call for construction and service through 263 Otis offices.

Add Otis *elevator* construction to Otis *elevator* research, planning, engineering, manufacturing and service and you have six reasons why the Otis trade-mark is the symbol of the world's finest elevators and escalators. Otis Elevator Company, 260 11th Ave., New York 1, N. Y.

BETTER ELEVATORING IS THE BUSINESS OF

REG. U. S. PAT. OFF.

Fortune's Wheel

The thousandaires

Teacher: Johnny, if Walter Carpenter, chairman of the board of the du Pont company, was paid $78,570 in 1923, and he was raised to $175,000 in 1948, how much more did he take home to Mrs. Carpenter in 1948?
Johnny: I don't know, teacher.
Teacher: Well, I'm not surprised, because his take-home pay in 1948 was $12,500 less than it was in 1923.

To which Johnny might have replied, "Well, what are we doing all this studying for?" And Johnny would have had a good question.

This and other perplexing problems of executive compensation are thoughtfully presented in "How to Pay Executives," page 107, a condensation from a new book, *Compensating the Corporate Executive*, by George Thomas Washington, judge of the U.S. Circuit Court of Appeals in the District of Columbia and V. Henry Rothschild II, member and chief counsel of the Salary Stabilization Board. Their conclusions are worth studying by all lawyers, executives, and directors of U.S. corporations, to the end that today's thousandaires may Sanforize their incomes against taxes and inflation.

V for vindication

Whether or not the British people understood the basic economic policies of Britain's Labor party, there is little doubt that they put Winston Churchill back in 10 Downing Street because they did not like the results the policies had produced.

One could find no better summary of the problems that face Mr. Churchill's administration and no better forecast of what it proposes to do about them, than the comprehensive report written by John Jewkes, which begins on page 79. Jewkes possibly is to Britain what Sumner Slichter is to the U.S. The article should provide strong encouragement to those who believe that the Conservative party will vindicate its victory.

Mountain to Mohammed

This month FORTUNE takes two looks behind the counters of U.S. department stores; one for a cartoon record of the chaos caused by the annual extravaganza, "the Christmas rush"; and the second to observe and report the new phenomenon of the retail trade, the suburban branch department store.

The latter is called "the new frontier of American retailing . . . destined to change radically the merchandising and shopping habits of all the larger metropolitan areas." For a coast-to-coast tour of "charge-and-take" suburban branches, plus a preview of the mammoth area being planned by Marshall Field in a Chicago suburb, turn to "Race for the Suburbs," beginning on page 99.

"Race for the Suburbs" was a collaboration between associate editor Dero A. Saunders and researcher Patricia Hough. From their thirty-three interviews, including eighteen with executives of different stores, both came away with one conclusion in addition to those reported in the FORTUNE story: the retail business, unlike many businesses where wrong decisions can be covered over for months, years, or forever, is audited daily. It is therefore fortunate that every sound rule has several exceptions, and there is also an exception to every exception.

Saunders joined FORTUNE's staff six years ago, researcher Hough a few months later. Both had come from government service; Saunders as a representative of the Foreign Economic Administration in Washington and the Middle East, Miss Hough as a lieutenant in the WAVES. Miss Hough majored in retailing at the University of Texas and later worked for Hecht's department store in Washington. Saunders is just finishing a 200,000-word condensation of Gibbon's *Decline and Fall of the Roman Empire* for the Viking Portable Library.

Writer Saunders and researcher Hough

Eero Saarinen and his father, the late Eliel Saarinen

The cartoons for "Christmas Business," page 103, are the work of twenty-three-year-old Roy McKie. Married, with two children, he lives in Bucks County, Pennsylvania, has won awards from both the Philadelphia and New York art directors' clubs, has had two prior appearances in FORTUNE: illustrations for "Great Day for the Dealer," November, 1950, and "TV's Time of Trouble," August, 1951.

Architects Anonymous

Probably no creative group receives so little public recognition as the architectural profession. Can you name the architects of Rockefeller Center? The Lincoln Memorial in Washington? The Empire State Building?

On page 82 FORTUNE publishes a story on one of the most distinguished business centers completed in recent years—the General Motors Technical Center. That he should escape, partially at least, the fate of his colleagues, FORTUNE wishes to make a point of the fact that its chief architect was a young American, a Finn by birth—Eero Saarinen. He is the son of an even more famous father, the late Eliel Saarinen, whose competitive but non-winning design for the Chicago Tribune Tower had a greater influence on this country's skyscraper architecture than any other single project.

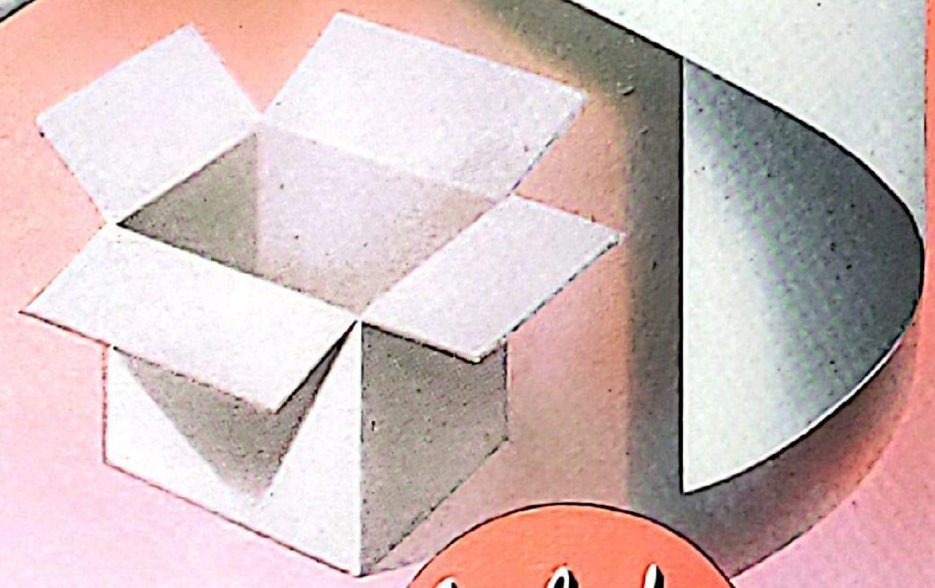
Russia has—we haven't

"Presses for the Jet Age," page 111, is a "bad news" piece. We have now not a single one of the big forging presses that are essential to produce modern planes, and won't get one until 1953, which means "thousands of planes for the ninety-five-wing Air Force will cost more and take longer to build than is necessary." The situation is inexcusable and alarming—inexcusable because it has been over six years since the Germans introduced us to the basic idea of the big forging press, and alarming because Russia has such presses.

Cartoonist McKie

Printer-slotter machine
at one of Gaylord's plants

it's the
unseen
quality
that produces
true economy
in Gaylord
Boxes



End of the Production Line...
Start of Extra Product Protection

Off they come! And after a final check for precision cutting and accurate printing they're on the way.

Here is all the sturdiness and durability that modern science can provide in a shipping container.

Gaylord Boxes are designed and built to provide superior product protection... and they do just that — all the way!

Call your nearest Gaylord Sales Office for competent help in solving your packaging problems.

GAYLORD CONTAINER CORPORATION, General Offices: **ST. LOUIS**

New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle • Indianapolis • Houston
Los Angeles • Oakland • Minneapolis • Detroit • Miami • Columbus • Fort Worth • Tampa • Cincinnati
Dallas • Des Moines • Oklahoma City • Greenville • Portland • St. Louis • San Antonio • Memphis
Kansas City • Bogalusa • Milwaukee • Chattanooga • Weslaco • New Haven • Appleton • Hickory
Sumter • Greensboro • Jackson • Omaha • Mobile • Philadelphia • Little Rock • Charlotte • Cleveland

Gaylord Boxes

CORRUGATED AND SOLID FIBRE BOXES
FOLDING CARTONS
KRAFT BAGS AND SACKS
KRAFT PAPER AND SPECIALTIES

The Author on America

"I pay frequent visits to the U.S.," writes Professor Jewkes. "And on my recent trips, along with my admiration for the energy and the buoyancy, I always find an uncomfortable feeling that something is happening in American society which is familiar to me because it happened in Great Britain.

"There seem to be in American colleges these days many teachers who speak of the virtues of a centrally planned economy with the starry-eyed enthusiasm and the almost touching innocence regarding the realities of economic life and organization which were so apparent in British universities between the wars. There are to be found in many American middle-class families talk of the supreme virtue of economic equality and signs of a sense of guilt that they are not as poor as some others—which is reminiscent of the conversations and attitudes of many British middle-class families as they fell under the sway of socialist propaganda in the early part of this century.

"There seems to be a growing contempt for profit making, a growing irritability with the untidiness, the tangled ends, the pains of readjustment which a system of free enterprise makes inevitable as, in the course of progress, it continually bursts out of its skin to take a new form. And I begin to ask myself: is it conceivable that the American people, having provided so strong a proof of the virtues of a free economy, are gradually becoming unaware of, or indifferent to, the secrets of their own greatness?

"Perhaps I am all wrong about this—I profoundly hope so. It would be odd and tragic if socialist ideas, like the movements of men, were destined to travel westward."

Has Great Britain a good record in production since 1945? In examining this question it is important to remember that output in one part of the economic system can always be increased if the cost need not be counted—in other words, if the effect upon production elsewhere need not be taken into account. In Great Britain, for instance, agricultural production is now about 20 per cent above the prewar level. This, however, has been made possible only by a policy of "featherbedding" the farmers—whose real income is now almost three times greater than before the war. The country has paid higher prices than those at which food might have been purchased abroad, and tax reliefs to farmers have meant higher taxes, and therefore reduced incentive, for other people. But it is production as a whole, and not production in any one section, that counts.

The figures most frequently quoted in support of the contention of increased British efficiency are those for the output of the manufacturing industry. But the same point holds here. Industrial production, within limits, can be measured. There are, however, many important parts of the system, such as transport, distribution, and commercial and financial services, in which the measurement of production is difficult if not impossible and on which additional burdens may be thrown in order to achieve increased industrial production. A case of special importance is that of employment in the civil service in Great Britain. The number of persons employed by the central government is now about one million more than before the war. A large number of these are undoubtedly employed in operating the planned economy. They constitute, therefore, a part of the cost of running the present kind of industrial system. But of course they are never counted in when measurements are made of productivity and output per head.

Since figures of total industrial production must necessarily be in the nature of estimates, different authorities and methods give different results. One possible comparison is that between British industrial production and that of other major industrial countries in recent years. It appears that the increase in industrial production in the United Kingdom as against prewar has, generally speaking, been higher only than in the countries very seriously dislocated by the war.

(1938=100)

U.S.	225
Canada	198
Sweden	165
Denmark	155
Norway	151
United Kingdom	*150*
Netherlands	139
France	121
Germany (W. Zone)	96
Japan	77

Statistics, however useful they may be, can give no real indication of the general atmosphere of uncertainty and frustration in which British industry is at present operating or of the long-term effects this may very well have upon the standard of living. It is not that profits cannot be made; owing to the high inflationary demand for commodities and services of all kinds, profits in British industry have not been unsatisfactory in the past few years. It is not that industry lacks men of ability. My own impression is that the younger British industrial executives are on the whole an extremely competent group who, under more favorable circumstances, might produce great results. It is not that industrial research is backward; some first-class work is going on in many industries. The real obstacles go deeper and spread wider than this.

Why bother?

In Britain today there is a general feeling that pioneering does not pay, that everyone is working in a confined space, which it is almost impossible to enlarge, that foresight and forethought are likely to be rendered useless by sudden and unpredictable acts of the state. In short, there are no longer any premiums for the old-fashioned economic virtues of energy, tenacity, courage, and imagination. There seem to be three outstanding reasons for this:

1. Present rates of income tax are naturally having a disastrous effect upon the accumulation of capital and the growth of smaller companies, for not only is it more difficult for the small man to plow back his savings into the business but the tax on profits sweeps up a substantial part of the undistributed dividends. Very few new companies are being established these days in Great Britain; the cost of that will have to be paid in future years. Two cases may be mentioned that reveal the present blindness to the normal motives moving men to action. Under the Town and Country Planning Act of 1947 no person selling land may receive for it more than its agricultural value. The purchaser of the land pays a price in two parts: the first part, the agricultural value of the land, goes to the owner; the second part, the value of the land for development, goes to a state agency—the Land Board. The consequence is, of course, that all incentive to sell land has been swept away.

The second case is more recent. On July 27, 1951, the Chancellor of the Exchequer announced, as part of his policy for dealing with the economic crisis, that he intended to restrict the dividends of all existing companies to the rates earned in the previous two years or to 5 per cent on the paid-up ordinary capital; new companies were to be allowed to pay 7 per cent. Such a scheme removes all incentive for companies to do better than in the past; it discourages firms just emerging from a period of costly development in which

continued page 176

G.M. TECHNICAL CENTER

Photographs for FORTUNE *by Ezra Stoller*

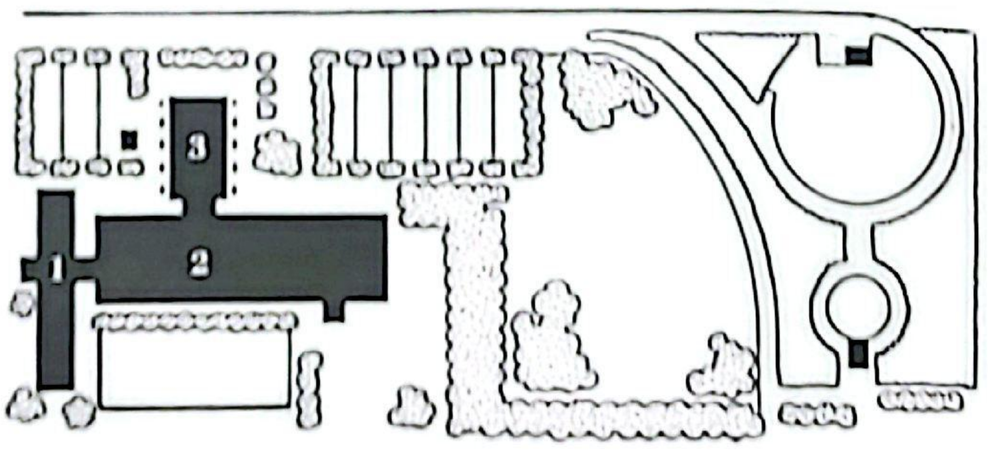
Thirty-five minutes by Cadillac or Chevrolet from Detroit's General Motors Building, on a plot at the junction of Twelve Mile and Mound roads, G.M. is raising a multimillion-dollar research center to top all postwar research centers. The first of four projected units, the Engineering Staff Group, is now completed, and the following pages constitute a FORTUNE preview and conducted tour of the new establishment. In its entirety some years hence, the Technical Center will be one of the century's notable contributions to an integrated industrial architecture.

Since the war there has been a phenomenal uprising of research laboratories. Nearly every major corporation, and many a minor one, has launched into building a shining new sanctum of centralized research. Nearly all have followed a pattern of ultramodern decor on parklike acres, far from the pressures and distractions of production departments or corporate offices. G.M.'s Technical Center conforms to the postwar fashion, but in its wedding of a great modern architect with G.M. engineering it achieves a new and serene integration.

The architect is Eero Saarinen and Associates, architectural offspring of the late, great Eliel Saarinen, ably assisted by Smith, Hinchman & Grylls, architect-engineers. Faced with the problem of designing for G.M.'s various independent and autonomous operating divisions a fitting research center, flexible enough for all purposes and expandable over the years, son Eero went beyond his father's clean, placid, orderly, and unpretentious artistry, Finnish in origin, into new industrial forms. The first steps were to standardize on structures and materials, with enough variability to avoid monotony yet permit uniform expansion step by step without any raw intermediary stages. Standards were designed to accommodate three variable forms: shop space, office-drafting-laboratory space, and special-use space. All three forms are exemplified in the Engineering Group (see diagram below).

In the selection of structures and materials, Saarinen and Associates had all the resources of G.M. engineering and of modern industry to draw upon. Probably no other contemporary structure has had such intensive, correlated architectural engineering in all stages of planning. Full-scale mockups of major structural units, such as external curtain walls, provided lengthy tests under outdoor conditions. Model rooms were built to test such details as an integrated lighting, acoustical, and air-conditioning system. Among the revolutionary features incorporated in the final design: a light, triangular steel truss of unusual design, which allows a clear fifty feet of floor space without interior supports; a high-velocity air-conditioning system, employing ducts so small that they can be led out through uniform utility outlets in the ceilings; and a new curtain-wall-panel material of marvelous lightness, insulating properties, and aesthetic satisfaction.

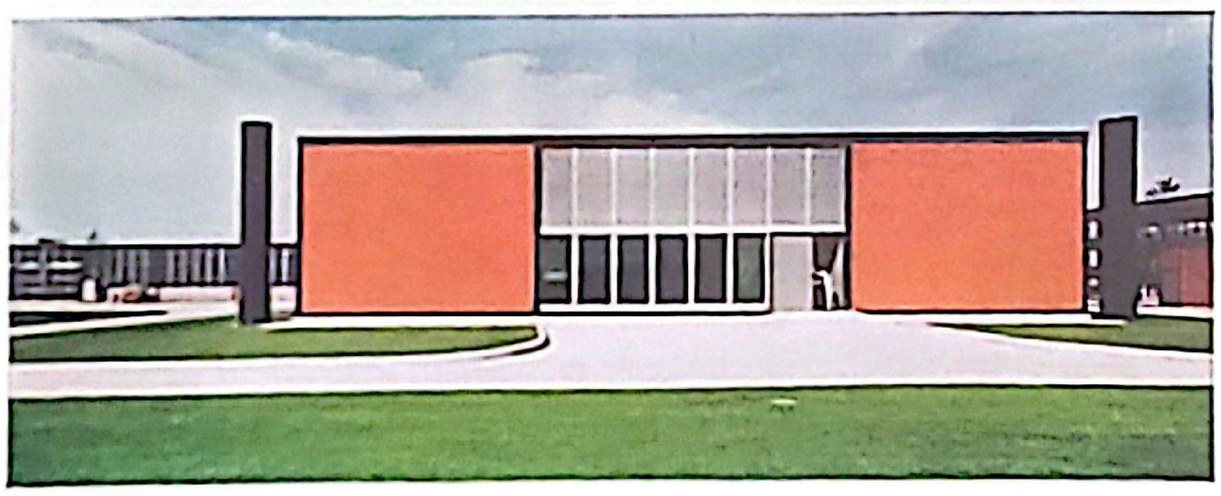
The achievement, which is Saarinen's, is to have held all this advanced technology under admirable control in designing an integrated series of buildings that are modern but not freakish, functional but not barren, imposing but not overblown, clean and cool in line but with an underlying warmth achieved through a bold orchestration and notable architectural use of color.



← *This diagram shows the ground plan of the completed Engineering Staff Group: 1. Engineering Staff Office Building; 2. Engineering Staff Shop Building; 3. Engineering Staff Dynamometer Building.*

The view on the opposite page is of the Dynamometer Building, with a colonnade of huge exhaust stacks, outlets for an elaborate ventilating system serving the engine-testing stands within. →

The panorama above embraces all units of the Engineering group: Dynamometer Building, left; Shop Building, center; Office Building, right. The small building, foreground, is a fuel-blending house.



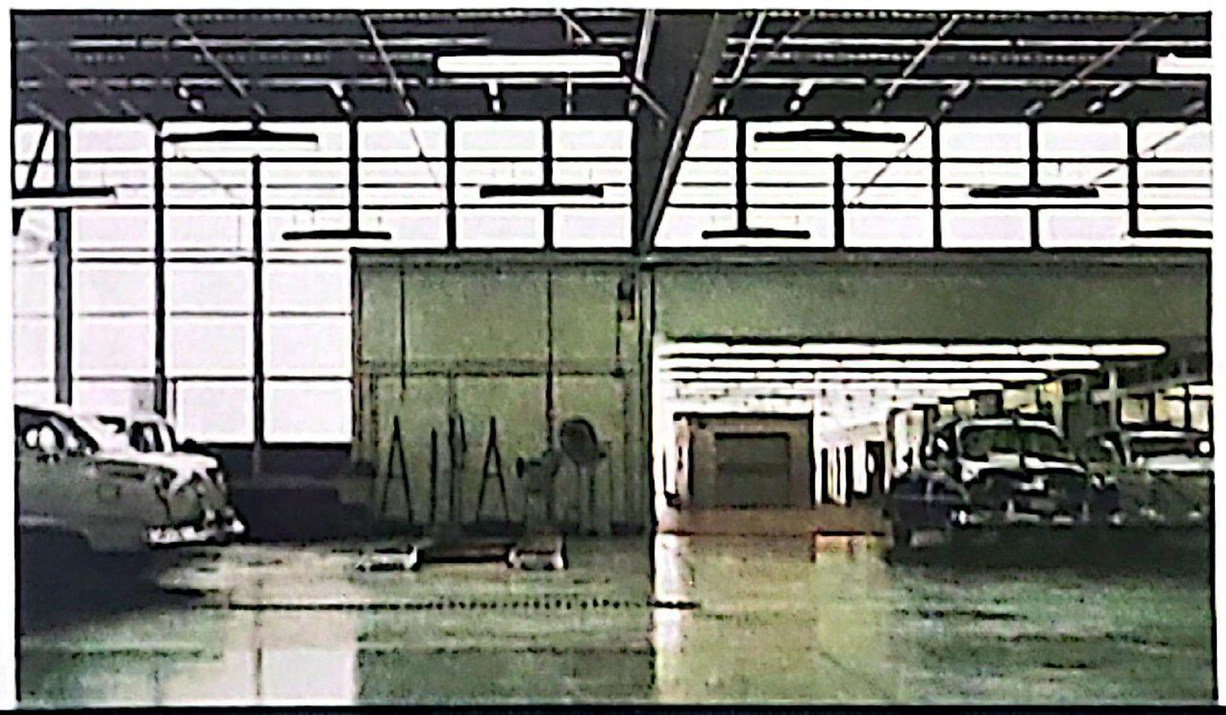
Dynamometer Building: the architects' best façade

Entrance and Office Building: an airy rectangle of blue-green glass, porcelain enamel, and red-glazed brick

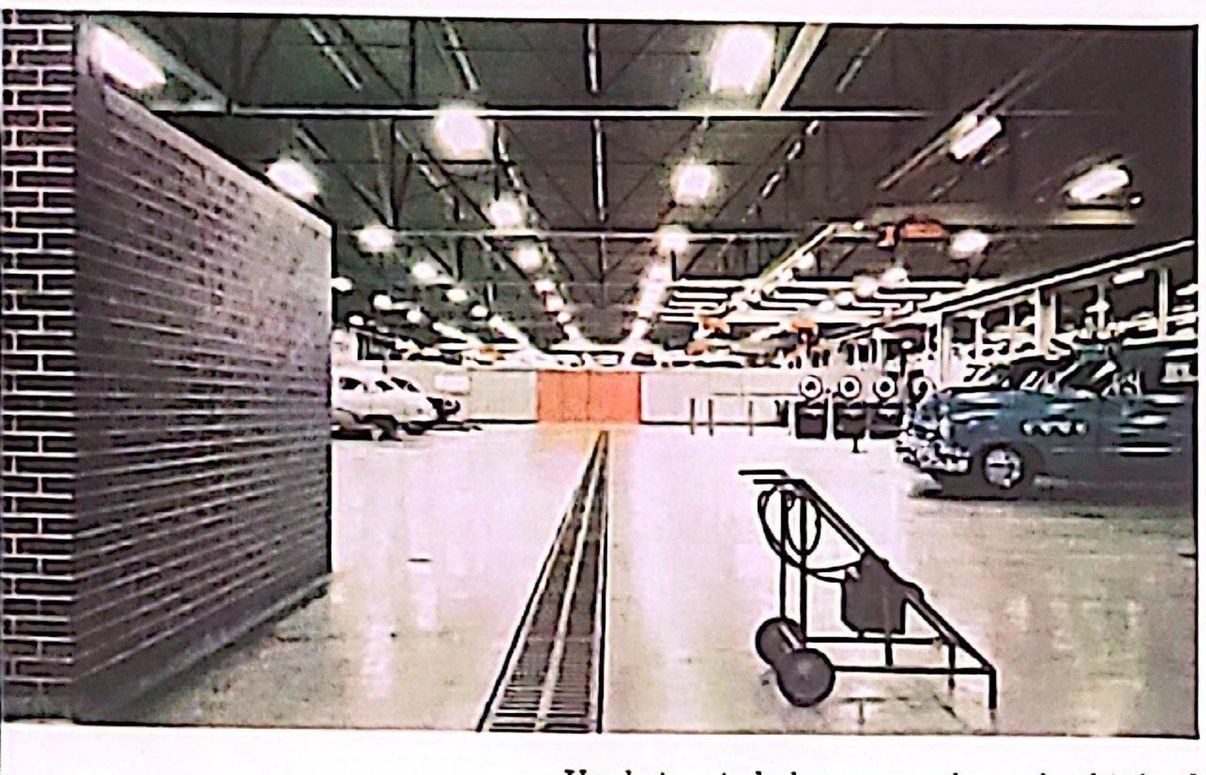
The fine equilibrium and pleasing proportions, from every viewpoint, of the Engineering Staff Office Building, focal point of the group, are based on a module of 5 feet 2 inches on centers—a module derived, curiously enough, from the length of a fluorescent lighting fixture. On this module, masterly ceiling treatment provides at every 5 feet 2 inches an outlet alternatively for lighting fixture, sprinkler, air-conditioning nozzle, or movable-partition attachment.

Equally striking are the long, facing curtain walls, composed of double-pane windows, employing a new, exterior, blue-green, heat-absorbing glass, set in revolutionary, light, two-inch wall panels formed by bonding porcelain-enameled metal sheets to a plastic-paper honeycomb core. The brilliantly colored end walls employ another innovation—a ceramic-glazed, sand-molded, Ohio shale brick, capable of taking high color. The brick was manufactured specially for this project, G.M. bearing the cost of building special kilns to operate at the requisite temperature.

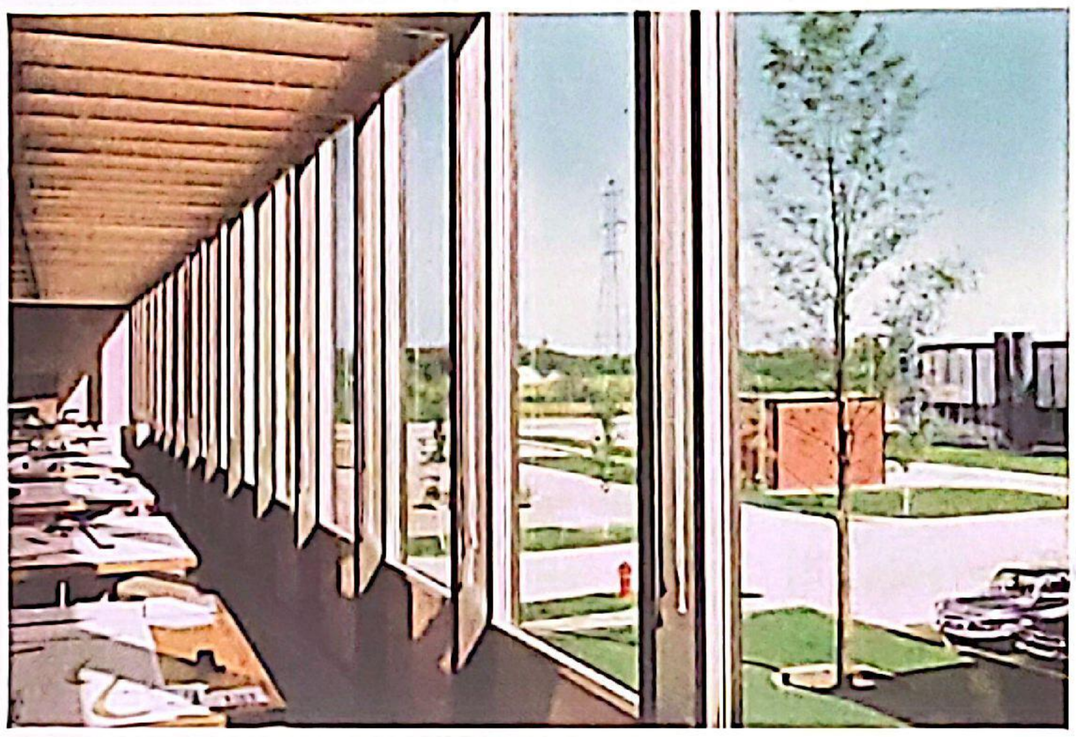
Office reception room with Saarinen-designed furniture



Shop interior and tunnel to Dynamometer Building

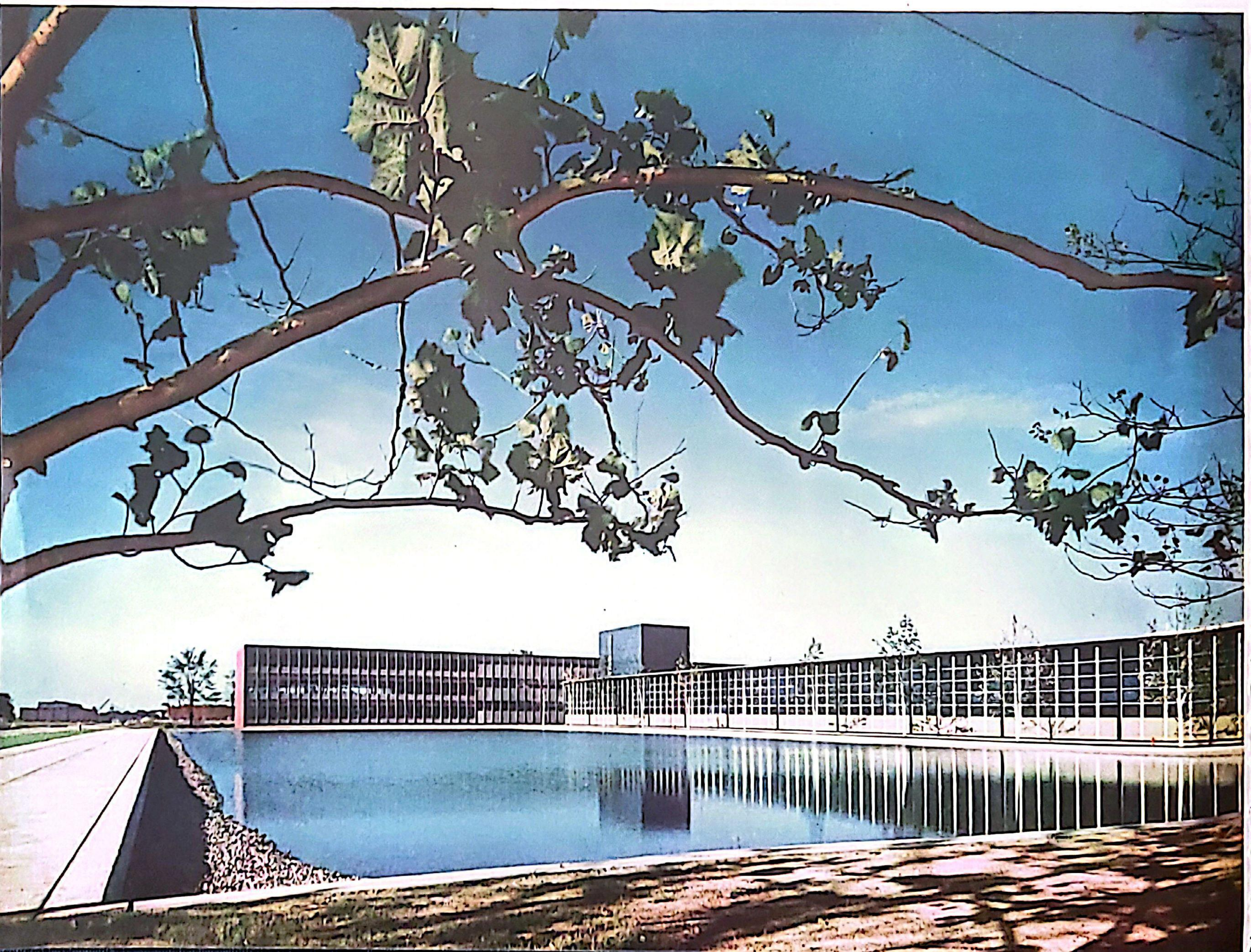


Unobstructed shop area, above, is obtained with only one row of supporting columns in a 160-foot span. Here vehicles of advanced design are assembled and tested.



Supports for the curtain wall, above, are 4 x 8-inch steel columns in the form of a hollow rectangle, requiring no special fireproofing in this semi-rural location.

Landscaping by famed landscape architect Thomas D. Church will be a part of the buildings' climate control



social-security coverage and is trying for clarification of the overseas income-tax exemption.

What manner of man is a C.M.A. member? Here are two, not untypical:

▶Frank Bandy of Colorado went to Alaska in 1929, at the age of seventeen. He figured that there he could make the money to buy what he likes—"Cadillacs and class in general." Bandy has never since worked in the U.S. His jobs have been in Alaska, Pacific islands, North Africa. In 1949 he came home with $42,000, got a Cadillac, stopped at good hotels, had himself a time. At the end of two years he was down to $226. He got a job in Morocco.

▶Ross Pritchard was born in New Jersey in 1904, went abroad in 1937, has done only a few months of U.S. work since. At home he was a plumbing foreman, president of his local union, a husband, a father, and a mortgagee. He went to Bahrein Island to raise mortgage money by fitting oil pipe. Thereafter he worked for Kellogg, Hegeman-Harris, Lummus, Sweeney, North Atlantic Constructors—in South America, Iceland, Greenland.

Pritchard got the mortgage paid off, but the house went with his wife in a divorce. Thereafter he began putting money into a 100-acre Florida orchard and a house. When he got back from Iceland in April, he blew $800 in ten days, then went out for Project Bluejay, the summer-only Greenland base job above the Arctic Circle. There he got $4.50 an hour as a foreman (common labor got $3 basic hourly pay). Conditions in Morocco Pritchard regards as plush; in Greenland there was red-flannel weather in July, no whiskey, not even an igloo to visit, much less a casbah.

Drawings by Honoré Sharrer

"The dynamic growth in retailing today is in the suburbs," says the chief executive of the largest U.S. department-store chain.

But a department store opening a suburban branch also has scope for costly mistakes. The article below points out some trends that promise impressive results for their practitioners and potential grief for those who buck them.

Department Stores:

Race for the Suburbs

by Dero A. Saunders

The new frontier of American retailing is the suburban branch department store. It is destined to change radically the merchandising and shopping habits of all the larger metropolitan areas. It has already done precisely that to the third-largest U.S. consumer market, Los Angeles, whose downtown stores last year accounted for a mere 35 per cent of the area's total department-store volume. The May Co., biggest of the traditional Los Angeles department stores, does nearly half its business in its Crenshaw and Wilshire branches; and the balance will shift decisively to the suburbs with the opening of May's third branch, a 345,000-square-foot giant in the Lakewood shopping center. Broadway Stores, whose growth in the last decade has been the competitive phenomenon of Los Angeles retailing, already gets over 60 per cent of its volume from four suburban units. So strong has been the Los Angeles movement to the suburbs that, to quote Broadway President Edward Carter, "the fun will get out of branching pretty soon. There will be enough of them so there won't be the justification for opening more."

In New York a recent count gave twelve downtown stores no fewer than three dozen suburban branches, with two more (the largest yet, both over 200,000 square feet) under construction. Brooklyn's Abraham & Straus, which only three years ago was bragging of its main-store location and ridiculing the idea of branches, will soon complete a 226,000-foot unit in Hempstead, Long Island. Macy's shows some signs, in New Jersey at least, of changing its rather puzzling branch policies. Gimbel's, despite its New York advertisement of a few years back boasting of being "all trunk and no branches," has long had a top-management committee studying suburban locations. And Lord & Taylor has temporarily shelved its urgent project of moving the main store uptown until it can increase its branches from three to at least five.

B. Earl Puckett, board chairman and boss of Allied Stores, has impressive credentials in the suburban-branch field. Allied's Bon Marché has a major branch in Seattle's Northgate, first of the great "packaged" regional shopping centers; the new "Shoppers' World" center (see page 101), just opened west of Boston near Framingham, is built around Allied's Jordan Marsh; and Allied's plans for ringing New York with large branches of its two units, Gertz and newly bought Stern's, could well tear the city's retailing wide open. Therefore Puckett deserves attention when he says, "The dynamic growth in retailing today is in the suburbs. Downtown store volume will become static—though if it's well operated it will be profitable."

Why the suburban branch department store appeared, how it is developing, and what it may do to the downtown store will be discussed in the chapters that follow.

Forerunner in Los Angeles

The Crenshaw retail district south of Hollywood was built around two separate major units: Broadway Stores' 220,000-foot branch (near foreground) and the May Co.'s even larger store just across the street. Complete with satellite stores and parking for some 3,700 cars, Crenshaw was the forerunner of the great regional shopping center. But the unfortunate traffic barrier between the two major stores, which are separated by busy Santa Barbara Avenue, shows why such a center should be planned as a single unit.

Spence Air Photo

Why suburban branch stores at all?

The downtown department store was driven into the suburban field by competition. Back in the 1920's the chains, particularly Sears, began to learn that an outlying store with good parking could generate substantial volume even if it was miles from the corner of Main and Elm. The chains have had a tremendous impact on such areas as Los Angeles: Sears, using its largest aggregation of "A" stores (ten of them, and not one downtown), is by far the biggest Los Angeles retailer, with a volume estimated at upwards of $150 million. "The real fathers of the suburban department store—let's face it—are Sears and Ward," admitted branch chief Stanley Goodman of Famous-Barr, the May Co.'s headquarters store in St. Louis.

However, suburban-located chain stores could become a competitive threat only because of more basic changes in the way that Americans lived and moved about. The population increase between 1940 and 1950 was the largest in U.S. history. The suburbs, growing much faster than the central cities or the countryside, accounted for practically half the total increase; and today's growth, at the startling rate of some 2,500,000 a year, is certainly continuing the same trend. How Americans move themselves and their goods about can be seen from a glance at motor-vehicle registrations—nearly 50 million today, versus only 32 million in 1940. And the resulting endemic traffic and parking problems are paralleled by another development: American mass rapid transit has not only deteriorated in quality but greatly increased in cost. In Chicago, for example, where bus and elevated fares are 17 and 18 cents, a couple and two children on a family shopping trip must pay about $1.40 just to look inside a Loop department store.

The extreme development of these factors—extensive suburban growth, more automobiles, choked traffic, inadequate parking, and poor public transit—explains the early appearance and rapid growth of the suburban branch department store in sprawling, geographically segmented Los Angeles; but every major U.S. city is

Hedrich-Blessing

Outpost of State Street

This plan for Marshall Field's Skokie project northwest of Chicago, designed by associated architectural firms Ketchum, Giná & Sharp of New York and Perkins & Will of Chicago, provides for three major department-store units: Marshall Field at the far northern end of the interior green, Carson Pirie Scott in the center, and a third (probably The Fair) at the southern end—just as they are on Chicago's State Street. These will be reinforced by some hundred smaller stores and the tall medical-dental-office building. Nearly half the 7,300-car parking area is on a lower level, both to cut maximum walking distance and for bad-weather parking. The entire building group is circled by a sunken but unroofed delivery roadway, which on one side is double width to provide a separate highway for public buses.

Lone Wolf Alternative

Intentionally avoiding other stores, Lord & Taylor chose a strictly residential area in locating its branch in Millburn, New Jersey. Its parking is adequate.

Charles Rotkin - P.V.I.

Charles Rotkin • F.P.I.

N. Y.'s "Miracle Mile"
This Long Island "strip center" began with Lord & Taylor's first suburban branch (lower right); promoter Sol Atlas cashed in by completing it (including the hospital and medical center in the background) and leasing to Best, McCutcheon, etc. Parking is its most obvious failure: there is not enough space; it is split into separate lots; and access is poor, through alleys between the stores. But its ultimate problem will be increasingly snarled traffic on heavily traveled Northern Boulevard.

Diane and Ray Witlin

Framingham, Night & Day
Two views show the new "Shoppers' World" center, west of Boston near Framingham, as it would appear to a shopper on the central green. Its forty-six stores, surrounded by a 6,000-car parking field, are on two levels on either side of the green, connected by a series of walkways. Its dominant architectural feature is the huge Jordan Marsh dome, which Board Chairman Earl Puckett of Allied Stores calls his "circus tent."

traveling down the same road. "All the time I hear how difficult it is to change the shopping habits of the people," remarks Huston Rawls, the peppery, irascible, and extremely able promoter of the new Framingham shopping center. "Hell, I wouldn't even try. But it shouldn't be difficult to get the retailer to change his habits to catch up with the people."

How big should a branch store be?

No suburban branch department store ever built has proved too large; but the retail world resounds with the laments of merchants who built them too small. "Unfortunately we were not farsighted enough at the time," says Vice President Harold J. Nutting about Marshall Field's old Evanston and Oak Park branches, now doing some $8 million a year instead of the $3 million originally planned. "Our mistake was in conceiving of them as outposts," says Harold Hodgkinson of Filene's in Boston, which opened a branch in suburban Wellesley as far back as 1923. "One criticism, they've always been too small. The day of the small branch is over." Lord & Taylor executives regularly kick themselves for building a little 51,000-foot shop in Manhasset on only two acres, with inadequate parking. The soaring volume of the Bon Marché branch in Seattle's Northgate shopping center ($10 million this year against a pre-opening forecast of less than $5 million) caused President Rex Allison to conclude, "There's nothing I'd do differently that we could afford, except one thing—we built it too small." And Jordan Marsh in Boston had to start building a 22,000-foot furniture store in the new Framingham shopping center, in addition to its 150,000-foot main unit, even before the center opened.

The Hecht Co.'s Silver Spring branch, just north of Washington, is a classic case of underestimation. Executive Vice President Charles B. Dulcan, who has made Hecht's the dominant Washington store, took an apparently daring risk late in 1947 when he opened a Silver Spring branch of 163,000 square feet, largest in the East at the time. Instead of the hoped-for $5 million it did $7,500,000 in 1948; the following year two extra floors were added, and a "bargain basement"—the first in any suburban branch department store—was installed. Despite obvious handicaps, Silver Spring's 1951 volume will be some $12,500,000, nearly a third that of the main store.

The crucial importance of size in a suburban branch derives from the fundamental strength of a department store, which is its breadth of departments and choice of merchandise under one roof; and the department-store branch must be of sufficient size to take those advantages to the suburbs. In the opinion of Morris Ketchum Jr., a leading U.S. store designer,

150,000 feet is the absolute minimum for a full-line suburban branch department store, assuming no bargain basement; Allied Stores feels that to be truly representative of the main store, a branch should be at least 200,000 feet; while P. G. Winnett of Bullock's in Los Angeles demands 250,000 to 300,000 feet to do the job right—that is, to make the customer "so satisfied that she gives up all idea of going downtown." How seriously U.S. merchants are taking this gospel of size is shown by the partial list (see box below) of new suburban branch stores.

As for parking space, it is difficult to find a merchant who believes he has enough. Most expert opinion recommends total parking area two and one-half to four times gross interior space—that is, a minimum-sized full-line branch of 150,000 square feet should have space for at least 1,000 cars at roughly 375 feet a car. However, it is also important that the most remote car be within 350 to 400 feet of the store. (This is one drawback to Famous-Barr's Southtown store in St. Louis —see page 166—where the far reaches of its 2,000-car parking area are 600 to 700 feet away.) And there is lively discussion of ground-level versus multiple-deck parking: most merchants prefer the former both because of its lower cost and because women shoppers allegedly dislike driving into a building; but multiple-deck plans have the advantage of providing some undercover parking for bad weather. However, in parking area no less than in store area, the chorus is "keep it big."

One surprising exception to the size trend is R. H. Macy & Co., whose five comparatively small branches in the New York area are in crowded retail districts with no parking worthy of the name. "I don't think they have a clear conception of what they're doing," remarked a prominent east-coast retailer. "Macy's branches aren't representative of what Macy stands for." And an outstanding West Coast merchant added bluntly, "Macy is just silly. If Macy stands for anything, it's big volume, big assortments, dynamic merchandising." The picture may now be changing somewhat, since Macy's top management has recently allowed Macy-owned Bamberger's of Newark to take space in the proposed new Princeton shopping center, and to assemble land for a future Bergen County center of its own. Even at Princeton, however, Bamberger's plans to start with a branch of only 60,000 square feet.

Does the arrival of the large branch mean that smaller branches are sitting ducks? Not necessarily. Dorothy Shaver argues that Lord & Taylor, primarily a fashion house, can be as representative of itself in a 90,000-foot branch as could a full-line department store in 250,000. The same argument applies to Filene's new 82,000-foot Chestnut Hill unit, which need not carry furniture, appliances, and housewares because the main store does not. The smaller suburban branch may be better run than a large competitor, or the smaller store may become so well established in a relatively limited market as to discourage any poaching. Nevertheless any toe-to-toe competition between large and small branches is likely to demonstrate the theory about the good big man versus the good little man.

Should it be alone, or in a suburban shopping center?

The term "shopping center" as used here does not mean the small neighborhood center, nor yet the "strip center" like Boston's Chestnut Hill or Long Island's so-called "Miracle Mile" (about which the only miracle is the profit made by promoter Sol Atlas). It means the fully integrated regional shopping center, foreshadowed by Los Angeles' Crenshaw (see page 98) and currently typified by Northgate, Framingham, San Francisco's Stonestown, and Los Angeles' Lakewood Center.

Such a center requires within less than thirty minutes' driving time a potential market of at least half-a-million population, most of it above the national income average. The center itself will generally be built on forty or more acres; it contains several hundred thousand feet of retail space, housing at least one large department-store branch and perhaps forty or more satellite stores; it provides parking for several thousand cars; it generally includes special-purpose units such as movie theatres or medical-dental buildings; it is carefully designed for easy flow of auto, pedestrian, bus, and truck traffic to, into, around, and out of the center. And above all, it is planned as a unit.

For the suburban branch department store, the great advantage of the regional shopping center is its controlled environment. A large group of stores, selected for both their competitive and supplementary aspects, exercises a combined drawing power far exceeding the sum of their individual appeals. For the customer, the center offers "one-stop" shopping in which practically any combination of merchandise wants can be satisfied by a single trip. And the shopping center, usually grouped around a landscaped green, offers for perhaps the first time shopping amid pleasant interior *and* exterior surroundings.

The alternative? If a store does not create an environment, then the environment creates itself. The tremendous pulling power of a large department-store branch inevitably attracts other stores; inadequate parking provision by the newcomers intensifies the problem of "parasite parking"; and the unplanned growth of the area can soon re-create in the suburbs the same traffic congestion that the suburban branch was designed to escape. This has already begun to happen to Famous-Barr's Clayton branch in St. Louis, while the "Miracle Mile" threatens to turn Long Island's heavily traveled Northern Boulevard into traffic hash. Furthermore, the coming of new stores does not give an area the advantages of a planned shopping center, for the strung-out store locations and separate parking lots generally require the customer to stop and park for every transaction. "I defy them," says architect Morris Ketchum Jr., "to make more than two stops, unless they are very determined shoppers."

The most galling experience for an individual department-store branch is to have other merchants cash in on its pulling power. For example, Hecht's Silver Spring branch was located some blocks outside the town's main retail section, which at the time totaled less than 100,000 square feet. The Hecht Co. provided a limited amount of parking space itself, relying on a county parking program to furnish the rest. The original county program is still short of completion; the Hecht branch has since been expanded by 40,000 square feet; new stores springing up around the Hecht unit ("Vultures!" cries Hecht Vice President Dulcan) have multiplied the previous retail area of the town by several times; and land that Hecht could have bought for $2 a square foot now moves at $10 to $15. It was this unhappy experience that caused Hecht's to plan its new Arlington, Virginia, unit as part of a shopping center (though its plot is too small).

As with the large versus the small branch, the shopping center does not necessarily doom the individual branch unit. A given suburban area may not contain a plot large enough for a regional shopping center; a cluster of large individual branches may achieve, in a haphazard way, sufficient drawing power to keep a center from being built. And merchants like Dorothy Shaver and P. G. Winnett may be right, for their own highly individualistic operations, in seeking separate locations

continued page 164

The New Branches Are Big

The ten branches below, all opened in the last six months or now building, average 245,000 square feet in size—more than the combined total playing area of four football fields, including the end zones.

City	Store and branch	Size *(sq. ft.)*
New York	Abraham & Straus, Hempstead	226,000
New York	Gertz, Flushing	220,000
Boston	Jordan Marsh, Framingham	172,000
Baltimore	Hutzler Bros., Towson	159,000
Washington	Hecht, Arlington	300,000
St. Louis	Famous-Barr, Southtown	290,000
San Francisco	Emporium, Stonestown	258,000
Los Angeles	Bullock's, Westwood	250,000
Los Angeles	Robinson, Beverly Hills	232,000
Los Angeles	May Co., Lakewood Park	345,000

lower the company's taxable income. "Pressure in this direction," the authors point out, "is particularly strong when the officers are also stockholders; by taking a larger share of the company's profits as compensation, they may—at least in some circumstances—succeed in reducing the tax load on the corporate taxpayer without correspondingly burdening themselves as individual taxpayers. Furthermore, by depleting the corporation's assets, estate and inheritance tax problems are diminished." However, "the important thing [for the corporation and stockholders] is to be sure that payments to executives do not exceed the bounds of legitimate business expense."

On the other hand, the executive usually expects three things from a compensation plan: "*(a)* to avoid paying a tax on a merely illusory benefit, e.g., stock which is never delivered, or which turns out to be worthless; *(b)* to spread his compensation (and hence his tax payments) over the longest period which can conveniently be arranged, thus obtaining continued income and avoiding the higher tax brackets; and *(c)* to avoid paying an unnecessarily high estate tax."

Significant sacrifice

Tax regulations and court decisions, however, are making it increasingly difficult for a company to set up a plan that allows both the corporation and the executive to claim tax deductions. The authors find "a significant tax trend [observable in deferred compensation and stock-option plans] toward denying the corporation the right to a deduction" when the payments under a plan offer attractive tax advantages to the executive. To attract or hold the executive, the company will now usually sacrifice its own tax advantages.

This tendency to guard management's income has raised violent stockholders' complaints. In one recent case, the charge was that President Charles P. Skouras and other executives of Twentieth Century-Fox had engineered a personal capital gain of $6,800,000 on subsidiary Fox Films shares that the parent company had issued to them and then bought back at a higher price. Instead of considering this payment as executive compensation and deducting it on its tax return, the company passed up the deduction so the executives could claim a capital gain. Similar treatment was given to stock options granted to top management. In the settlement reached in 1948, the executives agreed to forfeit two years of their pay under percentage contracts, and Skouras' share was reduced for the seven-year balance of his contract. Fox Films, after buying back part of the stock issued to the executives, saved a total of $1,938,000—but two-thirds of this went out in taxes and legal fees.

Management under contract

As relations between the executive and the corporation have grown more complicated, there has been a tendency by both to insist on a firm, written contract. Though the authors point out that such a contract "will not be quite so hard and fast as it looks on paper," some contain a whole string of clauses, beginning with those covering hiring, performance, and compensation and extending to such special matters as status, arbitration of difficulties, and indemnification against lawsuits. Even in the case of clauses that are fairly well standardized—the hiring clause, for instance—corporate practice differs.

Some companies merely "employ" the executive without defining his position. U.S. Rubber Co., for example, hired Francis B. Davis to serve "in an important managerial or executive capacity with such duties as may be assigned to him from time to time" by the directors. Often, however, executives insist that the dignity of their position be protected by specific title and authority. Usually the salary is fixed, yet the Woolworth Co.'s contracts, for instance, have traditionally left even this to the directors' discretion.

A most important contract clause today is that covering the executive's expenses, since legitimate business expenses may be tax-free for both him and the company. The clause may set a maximum figure for entertainment outlays, such as the $20,000 limit allowed Louis B. Mayer by Loew's, Inc. Or it may set a flat sum and cover specific expenses; thus President J. Spencer Love of Burlington Mills Corp. has been allowed $25,000 a year to maintain, equip, and staff four separate residences, three in North Carolina and one in Florida, for "the duty of entertainment."

When the facilities paid for by a corporation are obviously luxuries, they have been disallowed as tax-exempt. Lanteen Medical Laboratories, Inc., for instance, was held taxable for the golf course and the landscaped ranch with "imposing dwellings" that were provided for one executive. Yachts have been an allowable expense for entertaining customers, but considered taxable when used for pleasure as well as business. And the executive is likely to be taxed for the use of such "perquisites" as company cars and apartments when they are provided as part of his compensation. In any case the authors warn that the executive today had best keep detailed substantiating records of his expenses if he wants to avoid the tax collector. One executive whose expense records consisted chiefly of checks made out to cash and "self" had his tax deductions reduced from $10,300 to $444.

Reward from profits

But it is the profit-sharing clause of executive contracts that most reveals management's efforts to increase its rewards. Surveys have shown that over the last thirty years profit sharing has been adopted by perhaps 25 per cent of U.S. corporations. Where profits have been good, bonuses have often been generous; an N.I.C.B. study last year indicated that for corporation presidents bonuses ranged from 54 to 84 per cent of salary, and from 23 to 37 per cent for other executives.

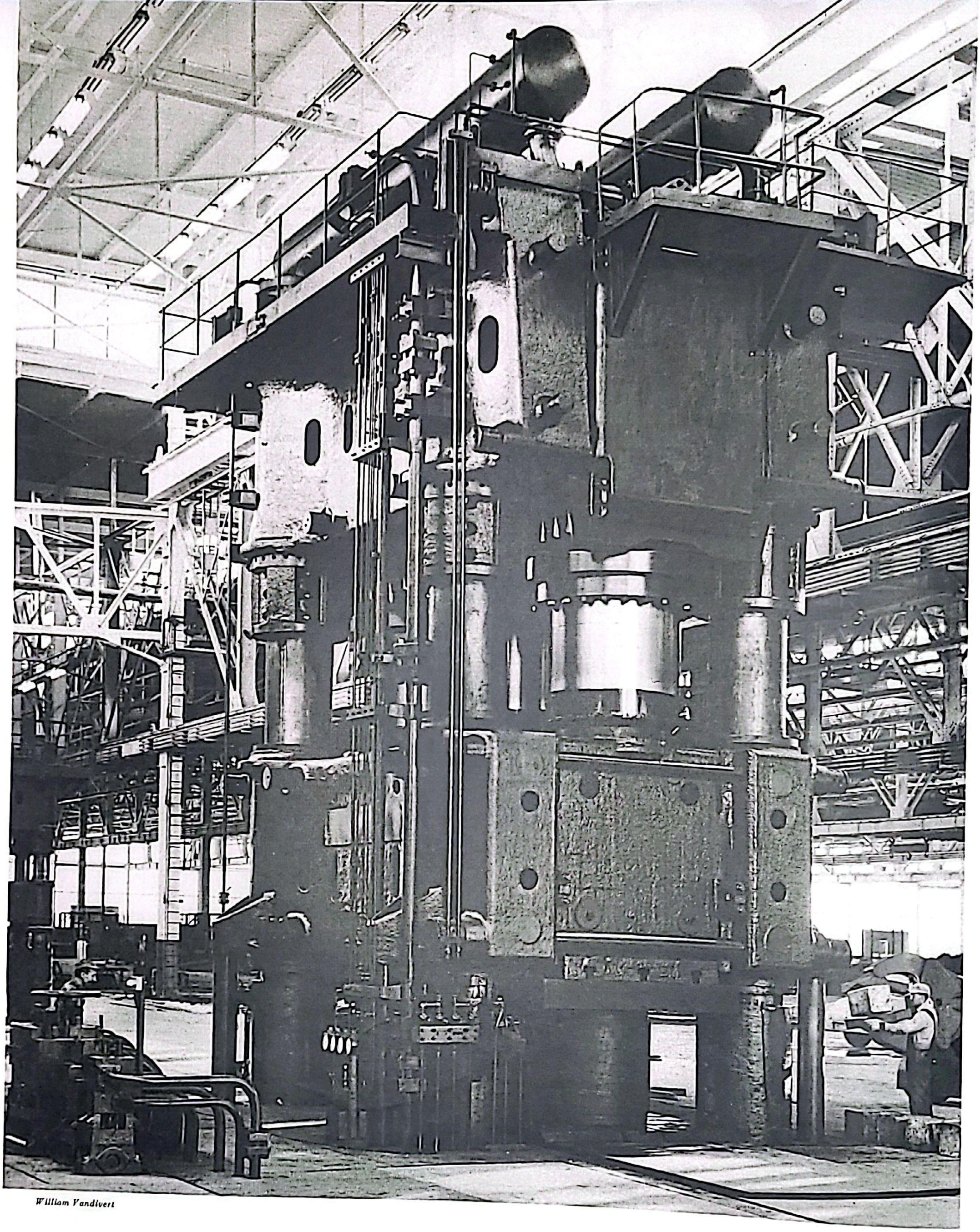
Executive profit sharing may be related to any one of several significant figures, including salaries, dividends, payroll, and sales as well as earnings, but the common

continued page 136

The Bite on Executive Pay

Income	Take-home pay *(Married, two dependents, joint return)* *After '52 taxes*	*Value in '39 dollars*	*Yearly cost of annuity to retire 50-year-old executive on half pay at age 65*	*Net value of a $10,000 raise*
$25,000	$18,000	$9,700	$10,000	$5,100
50,000	29,000	15,600	20,000	3,300
75,000	37,100	20,000	30,000	2,900
100,000	44,000	23,000	40,000	2,400
200,000	61,700	33,300	80,000	1,050
300,000	71,700	38,700	120,000	925

This table shows why the problems of executive rewards have long since ceased to be a matter of simple arithmetic. While the surtax bites on high incomes under the new 1951 Revenue Act have been only slightly sharpened, the impact of a 54-cent dollar means that the take-home pay of a $100,000 executive (married, two dependents) will buy what $23,000 would thirteen years ago. If he had to start paying for his own annuity at age fifty, he would have precisely $4,000 left to live on. Moreover, pay raises in the top brackets now amount to little more than generous gifts. A $50,000-a-year executive might almost manage to get a Cadillac out of a $10,000 raise, but at the $200,000 level such a raise would probably cover only a big cocktail and dinner party. Probably no executive on the higher earning levels would actually be so careless as to accept all his income immediately. Today he is likely to defer part of it by taking company stock under one of the popular "restricted stock option" plans. Such plans, now offered to top management by many big corporations, allow an executive to postpone his tax and cut it to a 26 per cent capital-gain tax, and also help him hedge against inflation while saving for his retirement.



William Vandivert

This massive German forging press, which once turned out aircraft parts for Hitler, has recently been installed at the Air Force's experimental plant at Adrian, Michigan. It can deliver a total pressure of 16,500 tons. Germany had one press twice as powerful (photograph opposite page), which was snatched by Russia at the end of World War II. The U.S. will not have anything comparable until 1953, when either a 35,000 or 50,000-tonner will probably be completed.

Presses for the Jet Age

For the next year and a half, at the very least, nearly every airplane built in the U.S. will contain basic structural members produced by methods that should by now be obsolete.

This means that thousands of planes for the ninety-five wing Air Force will cost more and take longer to build than is necessary. The reason: a total lack of closed-die forging presses of the size—25,000 to 50,000 tons—deemed essential for the efficient production of modern planes. When World War II ended, the Germans were using a press in this size range (photograph right) to turn out, in minutes, aircraft parts that required scores of man-hours to produce by conventional methods. This was mass production on a scale to astonish even U.S. engineers.

To correct the U.S. deficiency in big presses the Air Force, in the summer of 1950, obtained an appropriation of $210 million, reportedly to buy twenty presses, but actually only enough for about half as many. A year later only two or three press contracts had been signed and at this writing the entire heavy-press program is being completely restudied.

The new program will probably consist of one press of 50,000 tons, perhaps two or three of 35,000 tons, and three or four of 25,000 tons. A 75,000-ton press, on which work began eleven months ago, was of flexible design, and present plans are to scale it down to a 50,000 or 35,000-tonner. This press, whatever the final size, will be the first one finished, presumably early in 1953.

Meanwhile, planes will have to be built with forged structural members limited in size to those that can be turned out on the country's lone 18,000-ton press and two of 16,500 tons recently brought over from Germany. Even in this size range no one pretends that U.S. aircraft forging capacity is adequate.

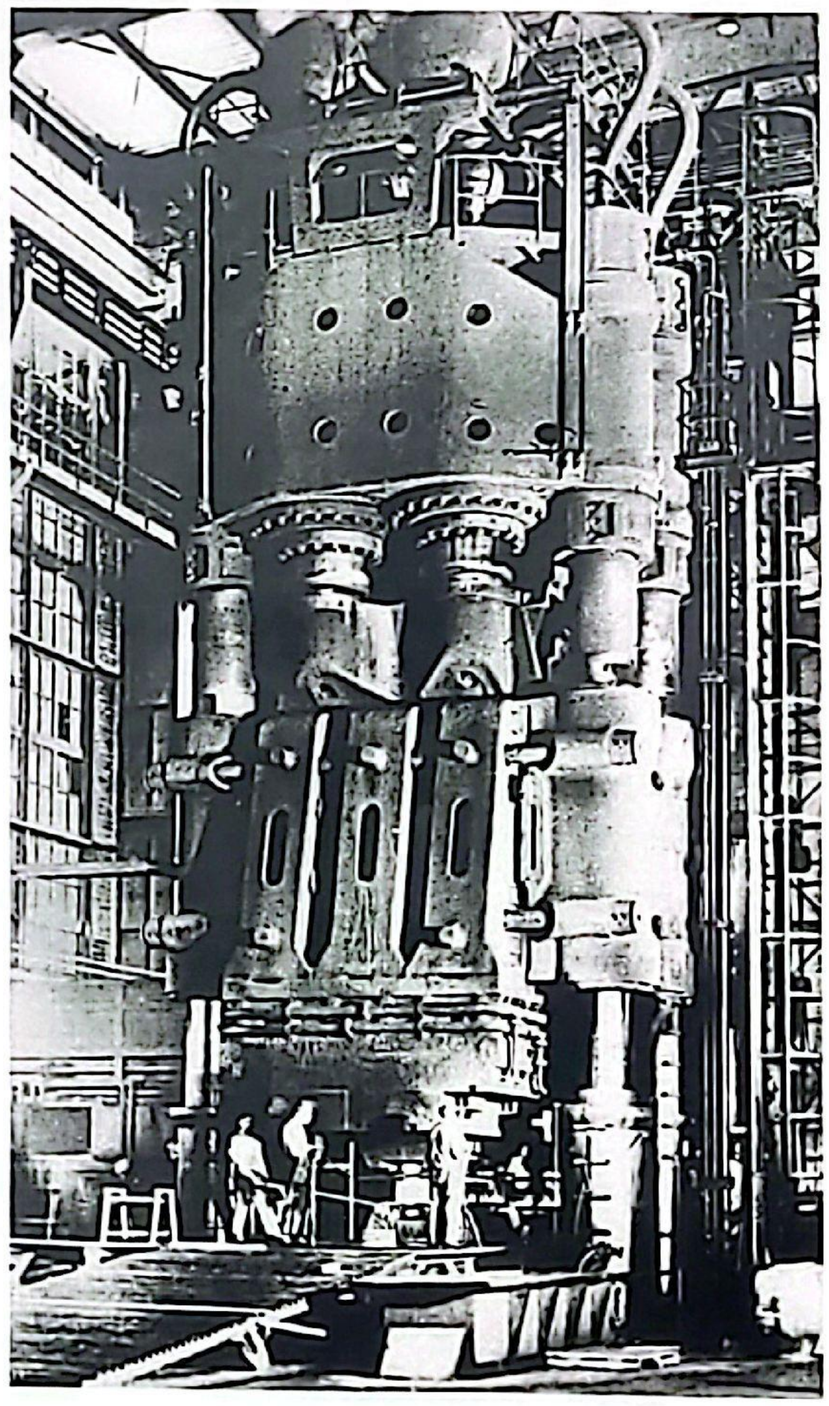
It is not easy to explain why nearly six years elapsed between the time U.S. engineers first discovered the German presses and January, 1951, when the Air Force signed its first big-press contract. For the delay, it appears that the aircraft industry must accept more blame than the Air Force. While it might seem that the Air Force could have bought a few good-sized presses anytime it had been willing to save elsewhere, it was reluctant to go ahead without full industry support. The industry, until quite recently, did not concede that big presses were necessary.

The role of the big press

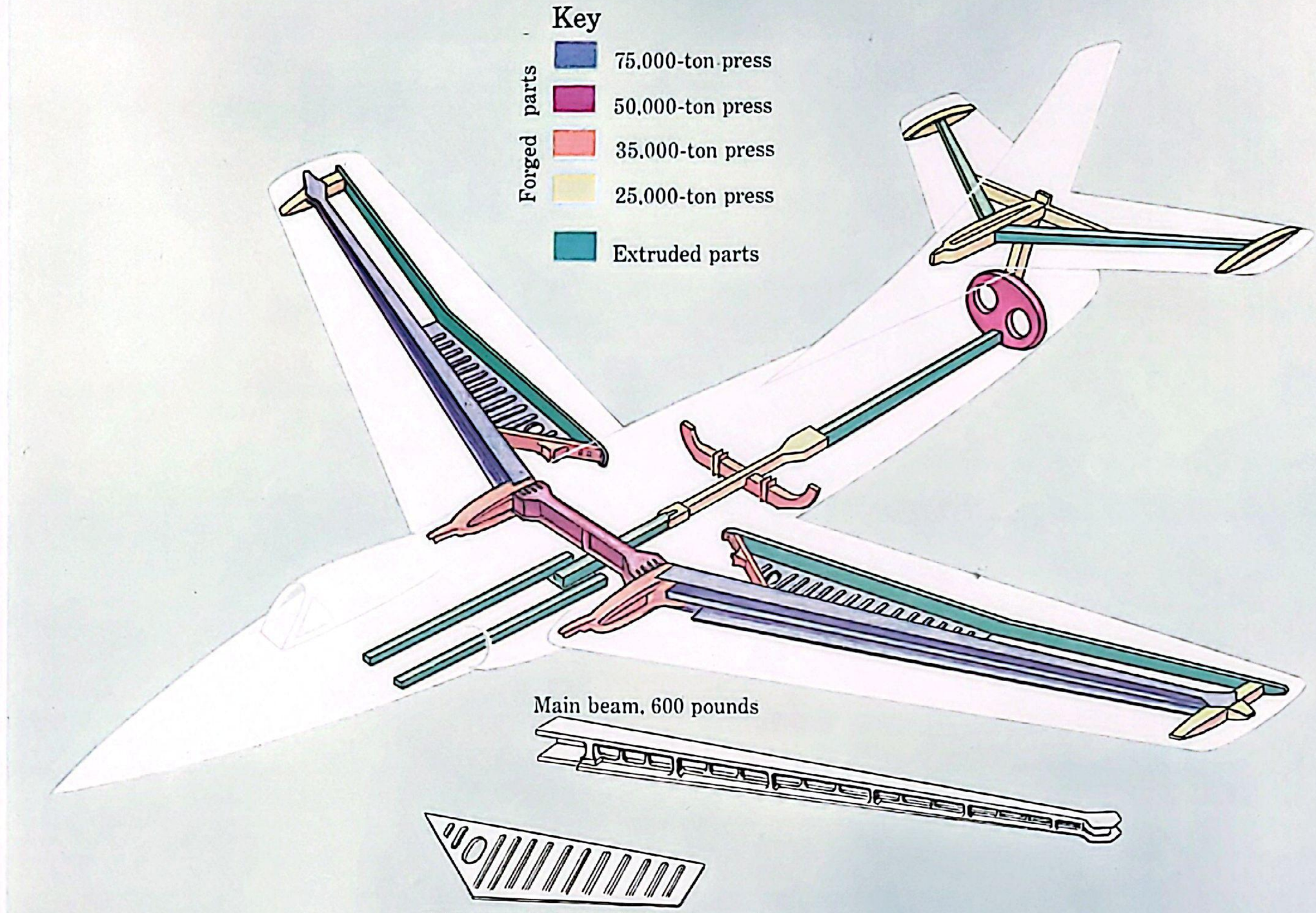
The idea back of the big German presses was simple and free from technical—if not economic—debate. In aircraft design it is axiomatic that a structural member made of one piece is preferable to a similar member fashioned from several small pieces, bolted, riveted, or welded together. It is also axiomatic that a part forged in one piece is stronger than a part of the same dimensions machined from a solid block of metal. (To obtain a graphic idea of why forging is superior to piecing together or machining, see page 113.)

What appealed to the Germans, of course, was that big forgings were not only strong, but—given a reasonable production run—saved a tremendous number of man-hours as well. Today, the severe aerodynamic stresses of jet flight tend to make large forgings indispensable. Their economy in man-hours and cost is becoming secondary. The razor-thin jet wing, in particular, has created incredible design problems. Designers of the rocket-powered Bell X-1, the first supersonic aircraft, met the problem by machining upper and lower halves of the wing from solid aluminum. The wings of the new Lockheed F-94C are being fashioned in much the same way. The F-94C will support a dead weight on each wing tip of 150 tons—practically the weight of a diesel locomotive.

The machining of wings from solid slabs



This is the formidable 33,000-ton forging press that the Russians hauled away from I. G. Farben's Bitterfeld works. Built in 1943, it is probably still the largest press in the world, though Russia is known to be building a 55,000-tonner. Russia, long fond of big presses, is presumably using this one to good advantage. To see the kind of aircraft parts such a press can forge, turn the page.



Drawings: Max Gschwind

of metal is not yet typical, but the trend—both in wings and fuselage—is toward greater use of large one-piece members, intricately shaped to shave every excess ounce. A growing number of such pieces have to be machined—or, as production men say, "hogged out"—from solid blocks of metal. Thousands of tedious machine hours go into the smallest jet fighter. Before switching over to pieces that could be forged on an 18,000-ton press, a certain plane required some 30,000 milling machine hours. The new parts, on relatively short production runs, are being forged at a dollar saving of about 50 per cent.

No accurate estimate can be made of the over-all savings that could be achieved if we had more and bigger presses, but 10 per cent of the cost of the bare airframe is almost certainly a reasonable guess. Such a saving on planes built only in 1952 and 1953 would add up to about $1 billion.

The U.S. lack of big forging presses might be less distressing if Russia were in the same fix. It isn't. Shortly after V-E day the Russians hauled away Germany's enormous 33,000-ton forging press. A U.S. technical mission actually got to the press first with orders to move it west or blow it up. Moving it on short notice was out of the question, and the U.S. decided, on second thought, that to blow it up would seem unfriendly to the Russians who were about to occupy Bitterfeld, where the press stood. Since there are not many railroad flatcars in the U.S. big enough to carry the largest parts of the 33,000-ton press, the U.S. Air Force wonders how the Russians managed the job. That they managed is not in doubt, for the press is reliably reported in operation. It is also known that the Russians have been building the monster 55,000-ton press they found on Krupp drawing boards. In all, Russia may have ten big presses, and they could well explain how it has apparently raised production of jets to an impressive figure.

Coming off second best in the race for the German presses, the U.S. has now brought over two of 16,500 tons and several smaller ones, but what with one delay and another, the job is still not finished after six years and moving expenses of well over $1 million. One of the 16,500-ton presses went into service about six weeks ago at the Air Force plant at Adrian, Michigan, operated by Bohn Aluminum. The press is now operating to full shop capacity turning out the urgently needed forgings. Alcoa is putting the second 16,500-ton press into its Cleveland forging shop and expects it to be running shortly. The only larger press in the U.S.—which broke down for several critical weeks last fall—is the Mesta-built 18,000-ton press operated by Wyman-Gordon Co., Worcester, Massachusetts.

Extrusion presses, also missing

The U.S. press deficiency is not limited to forging presses. We also lack large extrusion presses, which can squeeze out a variety of important structural shapes having a uniform, or slightly tapered, cross section. Where it can be used, extrusion can turn out pieces with strength comparable to that achieved by forging, at a substantially lower cost. Present largest U.S. extrusion presses: three of 5,500 tons. Russia obtained at least one extrusion press of 13,000 tons from Germany. Extrusion presses up to 25,000 tons, which the U.S. could use today, will not be delivered until 1953.

The tonnage rating for all these big presses refers to over-all pressure, i.e., specific pressure in tons per square inch multiplied by area. The minimum specific forging pressure for modern aluminum alloys is about fifteen tons per square inch, but for forgings containing thin panels, or webs, forty tons per square inch is often not too much. If forty tons per square inch

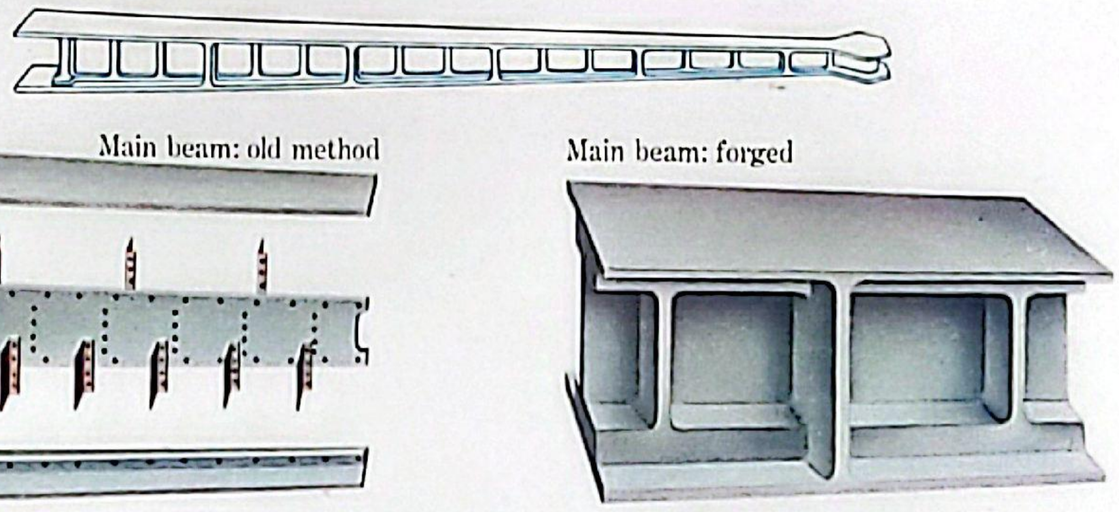
continued page 146

Tomorrow's Forged Airplane: Stronger, Lighter, Cheaper

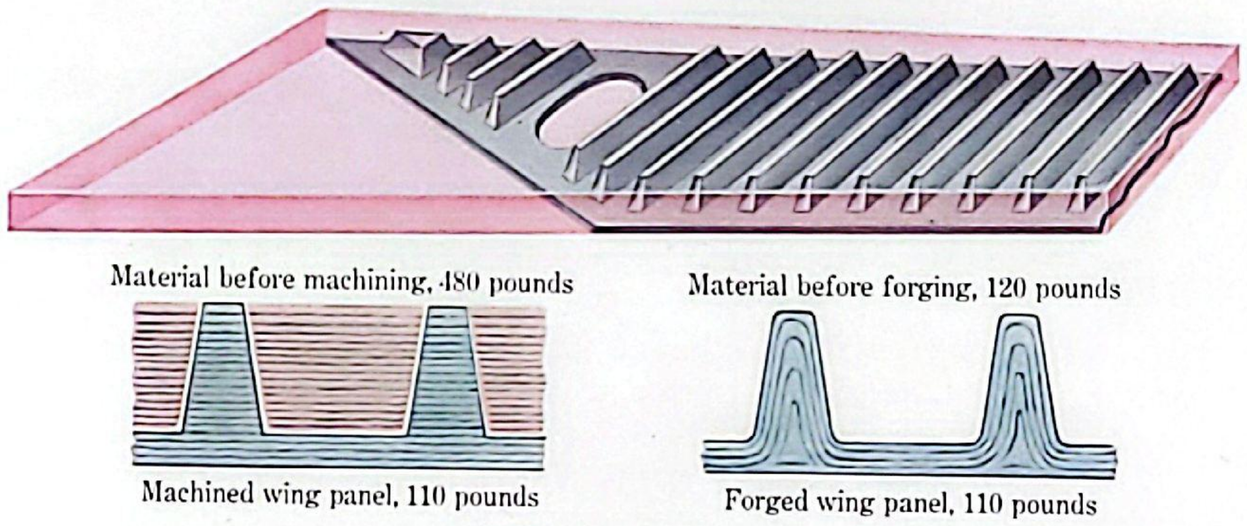
It is one of history's wry twists that the jet age is wholly dependent on the oldest metal-working art in the world, forging. The reason: forging will produce a stronger part, pound for pound, than any other method. It follows, all things being equal, that the nation with adequate forging capacity will build the best—and cheapest—airplanes.

The diagram, opposite page, shows some of the parts of a jet fighter that should be forged, for maximum efficiency, on presses of 25,000 tons and-up—presses the U.S. will not have until 1953. (Color key shows optimum press size for various parts. Below, a model of the proposed 75,000-ton press.) Meanwhile, a few of these parts can be forged inefficiently on smaller presses (for example, by forging one half of a wing member, turning it around and forging the other half). Other parts must be built up from bits and pieces or tediously machined from solid blocks of metal, as shown at right. Adding to the cost of the bits-and-pieces method is an array of expensive jigs and fixtures—in one case, $120,000 worth for a part that could be forged with dies costing an estimated $35,000.

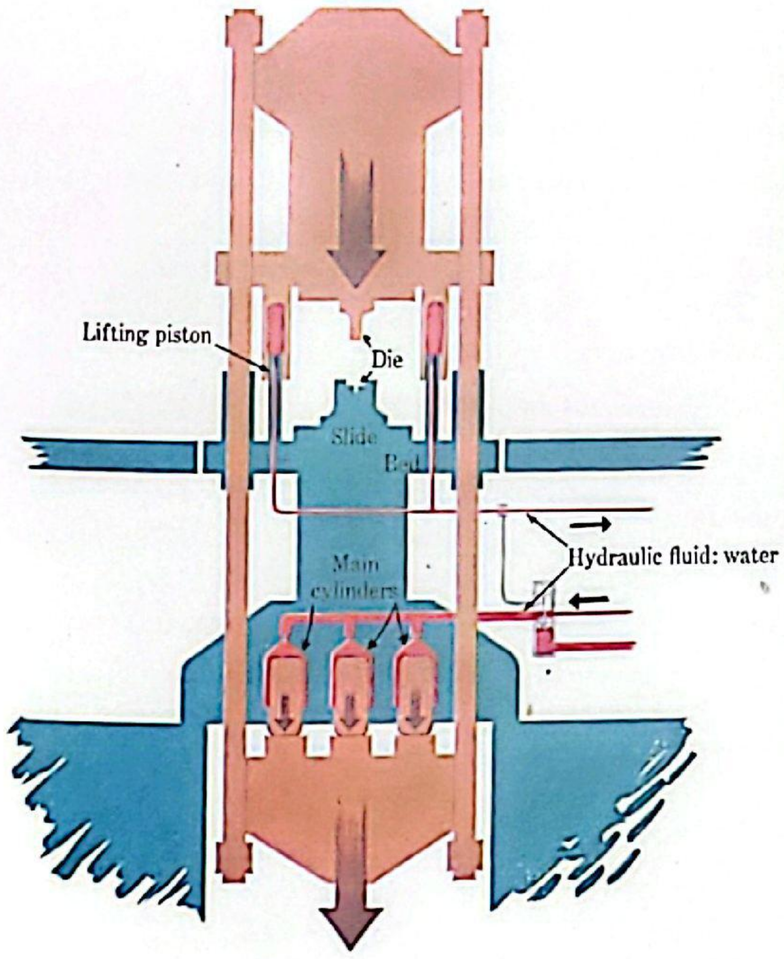
For producing certain shapes of uniform cross section (blue in the plane diagram), extrusion is even cheaper than forging. The U.S. now lacks large extrusion presses, but a number are on the way.



One wing beam, or spar, of a World War II Republic P-47 (detail, above left) contained about thirty pieces, scores of rivets, and took ninety-two hours to build. Today's cost: $580. Forged in one piece (detail, above right) it might cost under $250. Existing U.S. presses are far too small for jobs like this.

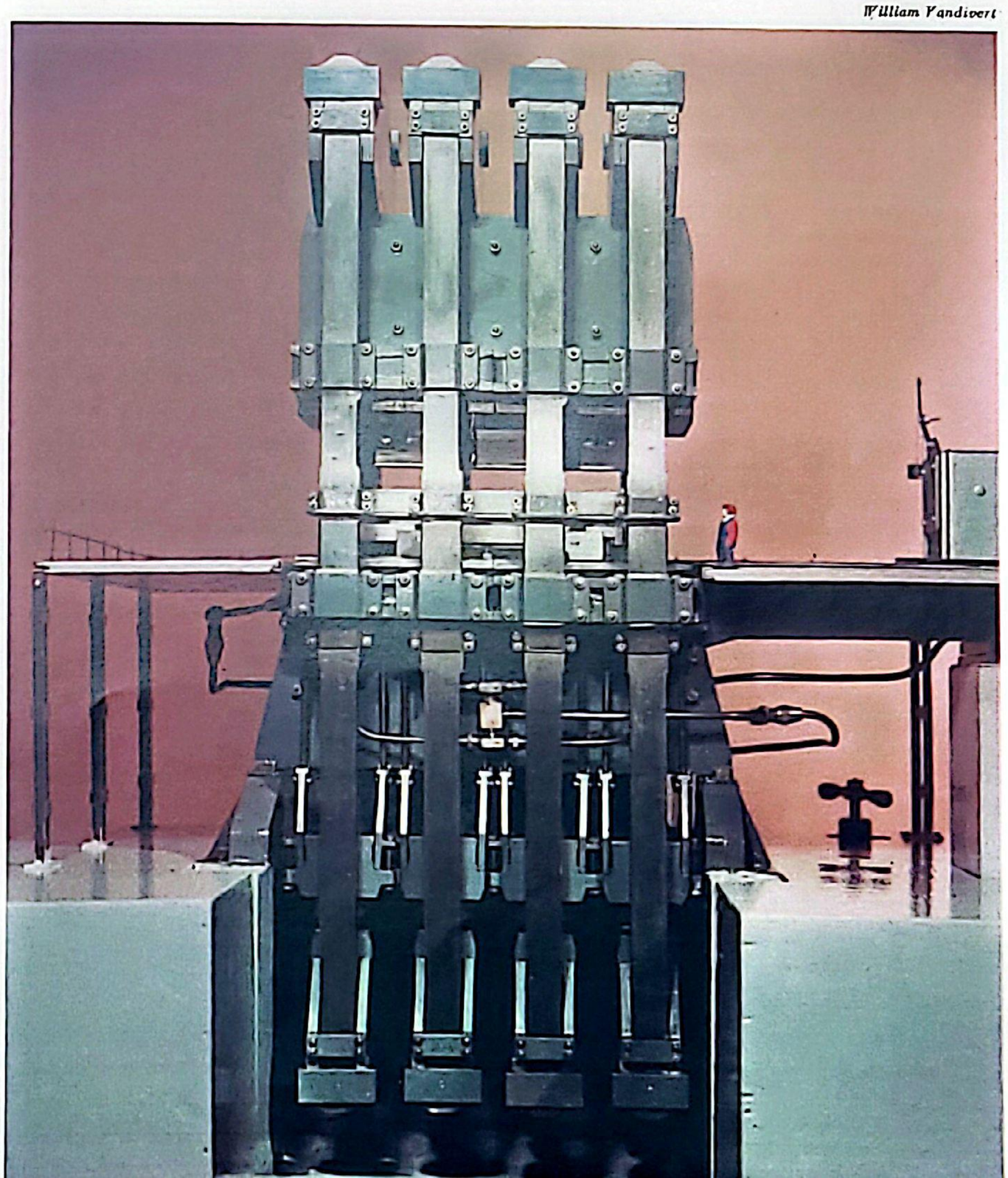

Material before machining, 480 pounds
Material before forging, 120 pounds
Machined wing panel, 110 pounds
Forged wing panel, 110 pounds

Integrally stiffened wing panel, above, unknown in World War II, is now found in almost all modern jets. Few panels are yet forged because very large presses are required. Most are machined from slabs of metal, and so have poor grain-flow structure in ribs, left. If forged, grain would flow unbroken up into ribs, right.



The great 75,000-ton press, if built, will look like the model, right. The press was actually ordered from Loewy Construction Co., but its pressure will be cut back to a more immediately useful value—perhaps 50,000 tons. As a 75,000-tonner it would cost some $7,500,000. Entire area shaded brown above moves down on forging stroke. Blue area is stationary. Die bed: 12 by 42 feet.

William Vandivert



People

McCaffrey of International Harvester

→

Fowler McCormick's successor is a salesman.

John Lawrence McCaffrey, fifty-nine, is well into his sixth year as president of International Harvester Co., the world's biggest manufacturer of agricultural implements. McCaffrey has been the chief executive officer of the company, however, for only six months. He became top man last summer, when Harvester directors gave him the executive powers previously held by Fowler McCormick, the board chairman. McCormick, scion of the Harvester dynasty, grandson of two of the world's richest men, Cyrus H. McCormick and John D. Rockefeller Sr., had been head of the company ten years. He promptly resigned the chairmanship, leaving McCaffrey in sole command.

The two men had been running Harvester as a team. McCormick, chairman since 1946, controlled company policy, with McCaffrey under him in the operating post of president. Together they reorganized the company, killed its traditional central command, created vertical product groups. They launched a $200-million postwar expansion program, introduced several new products, including a refrigeration line and a mechanical cotton picker. They worked hard to improve Harvester's sour labor relations, transformed it into one of the most progressive companies in the field. For much of this, the credit must go to Fowler McCormick.

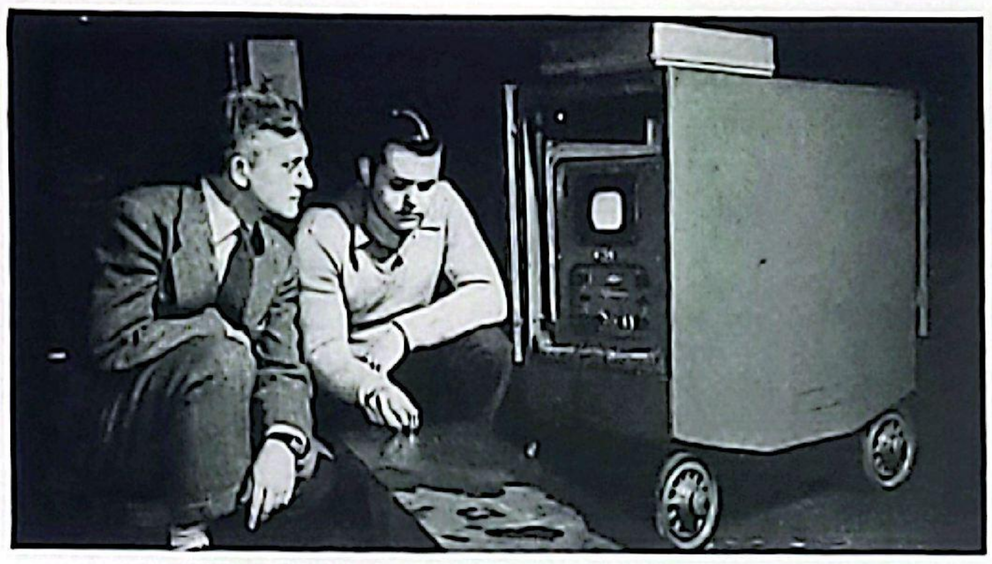
Three years ago, pneumonia hit McCormick and he almost died. His convalescence lasted a year, and afterward he spent more time than ever before at his Arizona ranch. This absenteeism provoked the directors into whittling down McCormick's powers and giving them to McCaffrey, who, in fact, was already exercising them. McCormick, though the biggest single stockholder, has nothing like working control of the company; he accepted the decision, though with reluctance.

It would be hard to dream up more disparate backgrounds than those of McCormick and McCaffrey. McCormick began life a multimillionaire, was a Princeton graduate, world traveler, art lover, student of psychology, intimate friend of C. G. Jung, the famous psychoanalyst, before he went to work for Harvester in 1925, at twenty-seven. McCaffrey was the son of a Fayetteville, Ohio, blacksmith who sold Harvester equipment. McCaffrey never went to college, was earning $38 a month pushing a hand truck in a Harvester warehouse in Cincinnati before he was seventeen. Later he moved to sales, rode a horse through Kentucky selling mowers and cream separators, became the first man to sell a Harvester truck fleet. By 1930, when McCormick, learning the business, took over a branch in Nebraska, McCaffrey was a veteran salesman and McCormick's boss. When McCormick became president in 1941, McCaffrey was sales vice president. McCormick made him first vice president in 1945, president in 1946.

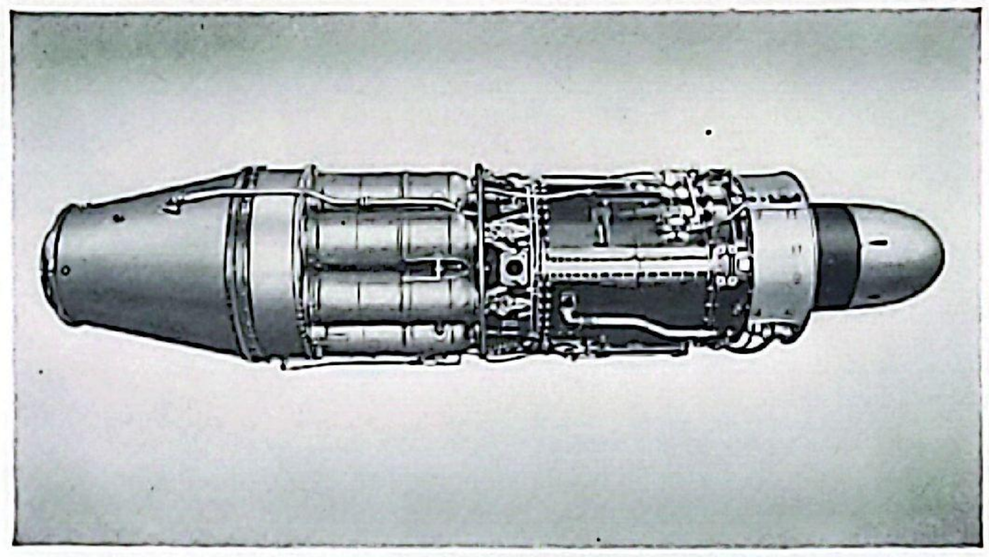
McCaffrey apparently has no intention of changing Harvester's direction. "McCormick and I started many of our policies together," he says. "They were good when he was on deck, and they're good now." McCaffrey sounds much like McCormick when he talks labor, is an ardent supporter of McCormick's enlightened industrial race-relations practices. "But," says he, "management must have its quota of militancy too, not to promulgate inequities but to say at the bargaining table, 'Men, this is honestly as far as we can safely go.' "

On other fronts McCaffrey has immediate problems—Harvester's steel and copper quotas for implement production have been cut 30 per cent. This can hardly help affecting a business with sales running at $1.25 billion this year, up $300 million over last year. (Harvester also has a defense backlog of $450 million.)

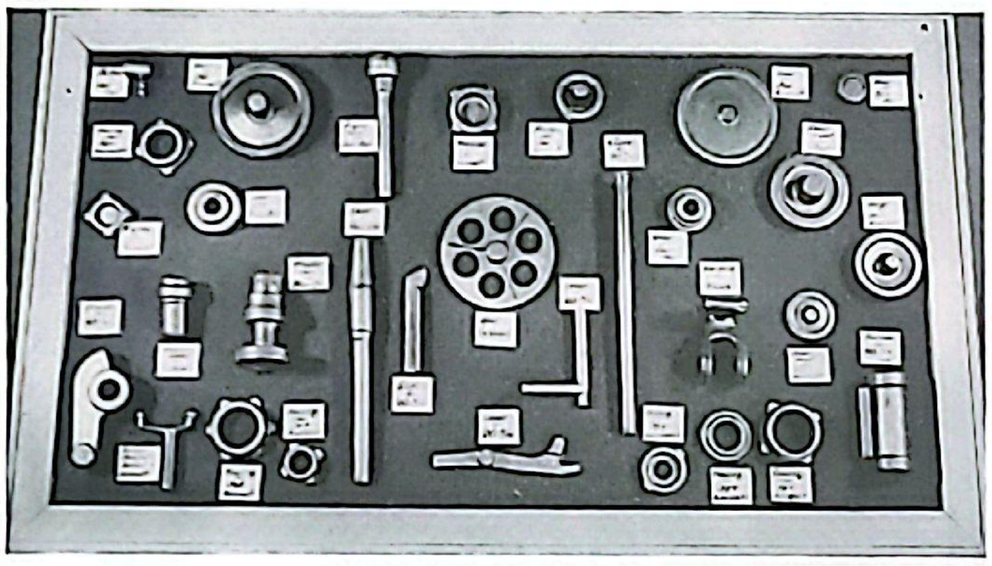
Harvester's new chief is a big man, over six feet tall, 220 pounds, and a dedicated worker. His workday at Harvester's Michigan Avenue headquarters in Chicago usually begins before eight, ends at six-thirty. (His motto is "get it done now.") He never takes more than three days off at a time, usually to hunt quail. He is a Roman Catholic, a lay trustee of Notre Dame, and lately he has taken a keen personal interest in Harvester's program of financial help to small colleges in plant communities. McCaffrey, married thirty-seven years, has two sons, both working for Harvester, and three grandchildren. The McCaffreys sold their suburban home after their sons married —a move McCaffrey regrets. Now they live quietly in a Chicago apartment.



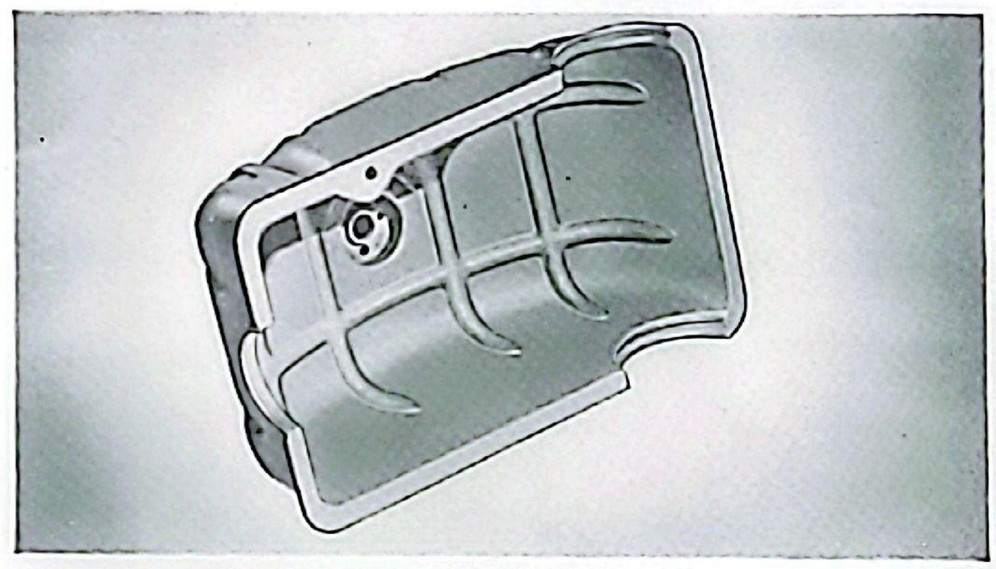
Ultrasonic waves on a Reflectoscope screen prove the effective heat treating this high speed steel bar received. Forged by Barium's Industrial Forge & Steel, Inc., Canton, Ohio, for the tool industry, it's one of scores of heavy forgings (including carbon and alloy) this company makes for scores of industrial uses.



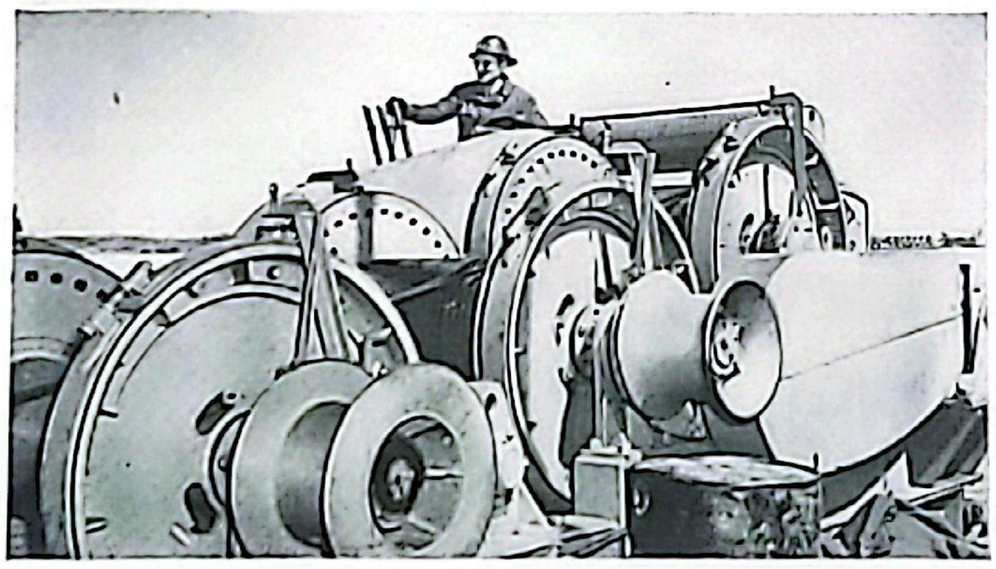
Lightning-like jets are powered by J-47 Jet Engines. A Barium subsidiary, Jacobs Aircraft Engine Co., Pottstown, Pa., supplies the manufacturer with vital components to produce these engines . . . gear box assemblies, auxiliary drives, etc. In addition, Jacobs makes complete reciprocating aircraft engines for the industry.



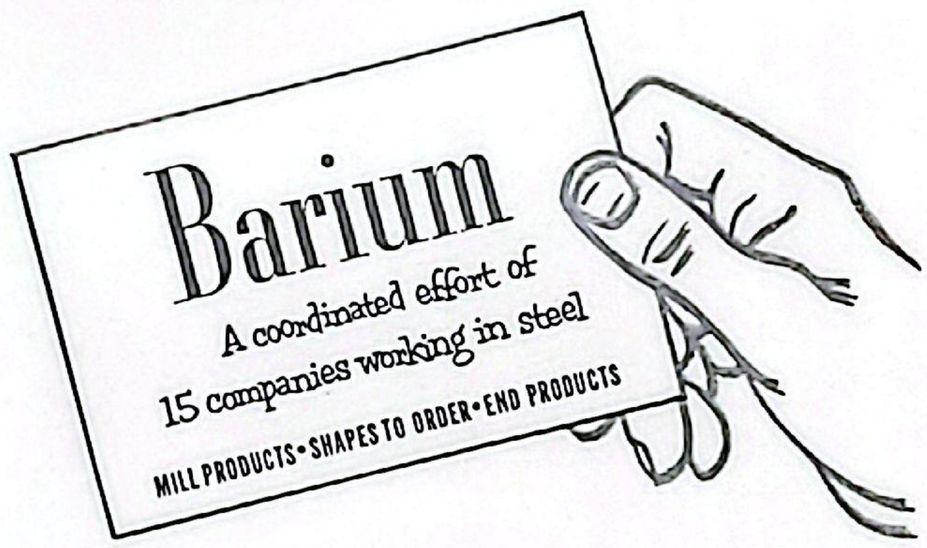
To keep production high and high-grade, industry needs high strength drop forged components. Industry gets them, in the many parts shown here, from Globe Forge, Inc., a Barium member company. Included are automotive gears, shafts, shifters; jet aircraft housings; gun levers, pistons, etc.



This diesel engine oil pan, produced for General Motors, is lighter, better-looking, lower cost because it is *stamped,* not cast. It is typical of medium and heavy stampings made by Barium's Geometric Stamping Co., Cleveland, O., which serves many industries as an extra manufacturing department.



Safer, faster, more efficient materials-handling is crucial in the construction industry. American Bridge Co. is getting just that, thanks to this steel erectors hoist made by Clyde Iron Works, Inc., Duluth, Minn., a Barium subsidiary. Clyde Whirley cranes also serve industry's materials-handling needs.



BAYONNE BOLT CORP. • CENTRAL IRON AND STEEL COMPANY • CHESTER BLAST FURNACE • CLYDE IRON WORKS, INC. • CUYAHOGA SPRING COMPANY • ERIE BOLT AND NUT COMPANY • GEOMETRIC STAMPING CO. • GLOBE FORGE, INCORPORATED • INDUSTRIAL FORGE & STEEL, INC. • JACOBS AIRCRAFT ENGINE CO. • KERMATH MANUFACTURING CO. • KERMATH LIMITED (CANADA) • PHOENIX BRIDGE CO. • PHOENIX IRON & STEEL CO. • WILEY MANUFACTURING CO.

Presses for Jets

continued from page 112

is needed, even a 75,000-ton forging press cannot turn out a piece bigger than thirteen square feet—approximately the size of the wing panel shown on page 112. (For notes on extrusion, see box, right.)

The big forging and extrusion presses expected in 1953 and 1954 will be the first tangible results of the so-called "heavy-press program" which officially got under way in the summer of 1950. The original program called for nine forging presses—one of 75,000 tons, two of 50,000, three of 35,000, and three of 25,000—and eleven extrusion presses ranging from 8,000 to 25,000 tons.

This past September the Under Secretary of the Air Force asked for a complete re-examination of the heavy-press program because he felt it had been based on a series of rough estimates rather than on actual forging requirements. A new program will be drawn up after a careful survey of all military aircraft designs to see exactly what parts—now being pieced together or hogged out—can be forged on presses of 25,000, 35,000, and 50,000 tons. The 75,000-ton press will be deferred indefinitely since it would raise too many operating problems. As one Pentagon official explains, "We have no time and no money today for the luxury of research."

While the original twenty-press program was supposed to have been fitted into an appropriation of about $210 million, it now appears that twenty big presses, with buildings and adequate supporting facilities, might have cost $450 million or more. The Under Secretary hopes that the revised program will add up to less. Whatever the final number of presses, the Air Force will hold title to everything and negotiate management contracts with private firms. It is still assumed that Wyman-Gordon, which was to have operated the 75,000-ton press, will get the first of the new presses, a 50,000-ton unit, plus a second of perhaps the same size. Other presses will probably go to Alcoa, Reynolds Metals, Kaiser, Harvey Machine Corp., Curtiss-Wright and a few others.

The big-press designer

At this writing only three press contracts have been signed—all with Loewy Construction Co., a wholly owned subsidiary of Hydropress, Inc., New York. One contract covered the 75,000-ton press (see model, page 113), for which Loewy will now substitute something smaller. Loewy's other two contracts cover a second large forging press (exact size also undetermined) and an extrusion press of 25,000 tons.

Loewy and Hydropress have no manufacturing facilities of their own. They maintain that for their range of work (they also design rolling mills and a wide variety of other special machinery) it would be virtually impossible to assemble under one roof all the special manufacturing equipment they would need, so they prefer to subcontract everything.

President of both Loewy and Hydropress is Erwin Loewy, a Czech by birth, who has been in the heavy-press business since 1920, first in Germany, later in England, and, since 1936, in the U.S. Between 1942 and 1945 Loewy supervised design of more than eighty extrusion presses—including the country's largest—for U.S. industry.

When World War II ended, Erwin Loewy figured that the U.S. would, sooner or later, be in the market for big presses. He had his engineers—including the engineer responsible for Germany's 33,000-ton press—begin improving German designs and ultimately spent about $200,000 before his firm was awarded its first Air Force study contract in 1948.

The big-press program will tax the metalworking and handling facilities of the biggest machine shops in the country. In fact the size of the largest press was originally pegged at 60,000 tons because it was thought that none larger could be built. However, by making modifications in design, Loewy engineers worked the practical limit up to 75,000 tons.

While Loewy is generally conceded to be the foremost authority on big presses, almost every firm in the U.S. with press experience will be called upon to contribute to the program. None has any illusions that the job will be a lark. "This isn't the kind of thing that as a businessman you go out and hanker for," said one engineer. "It may put a star in your crown, but it will plug up your shop something awful."

Germany was there first

It is never pleasant to discover that the U.S. has not been first with a major technological development, particularly one that has to do with mass production. In making large light-alloy forgings Germany was ten years or more ahead of U.S. industry. The fact was first brought home to the Air Force when it began examining the wreckage of German planes in 1942. At a time when the largest aircraft die-forging press in the U.S. was only about 4,000 tons, German planes contained forgings made on a 16,500-ton press.

Germany built the first of its big presses, a 7,700-ton unit, in 1926 when it discovered that magnesium—which it had in abundance—could not be forged by hammering. Under a hammer blow, magnesium tended to shatter rather than flow. Hammering, of course, is the oldest of the forging methods, and in the U.S. the art of forging complex aluminum shapes on mechanical hammers had been developed to a high degree.

Germany did not have its big press for magnesium very long before it discovered that the press had important advantages over the hammer for aluminum as well. Hammers were relatively cheap, but they were rough on dies, which were not cheap. Since a press did not pound dies to pieces, they lasted a good deal longer than they did on a hammer. There was also a limit to the size of piece that could be forged by hammer. A press, on the other hand, could be built to almost any desired size. The 33,000-ton press that Germany built during World War II could forge aircraft spar caps thirty-three feet long—a dimension inconceivable by hammer forging of light alloys. (The longest U.S. forging appears in the photograph at left below.)

Since the end of the war a new factor, perhaps foreseen by German scientists, has given the press a decisive advantage over the hammer. The new high-strength aluminum alloys, like magnesium, react badly to hammer blows and must be press-forged.

The important point to be noted is that in Germany the big presses were part of an orderly technological development, and were financed as a business proposition. Even the 33,000-ton press appears not to have been directly subsidized by the Nazi government. It is difficult, of course, to draw the line between projects subsidized directly and indirectly in wartime. But it is certainly true that in Germany industry brought big presses to the attention of the Luftwaffe, not vice versa.

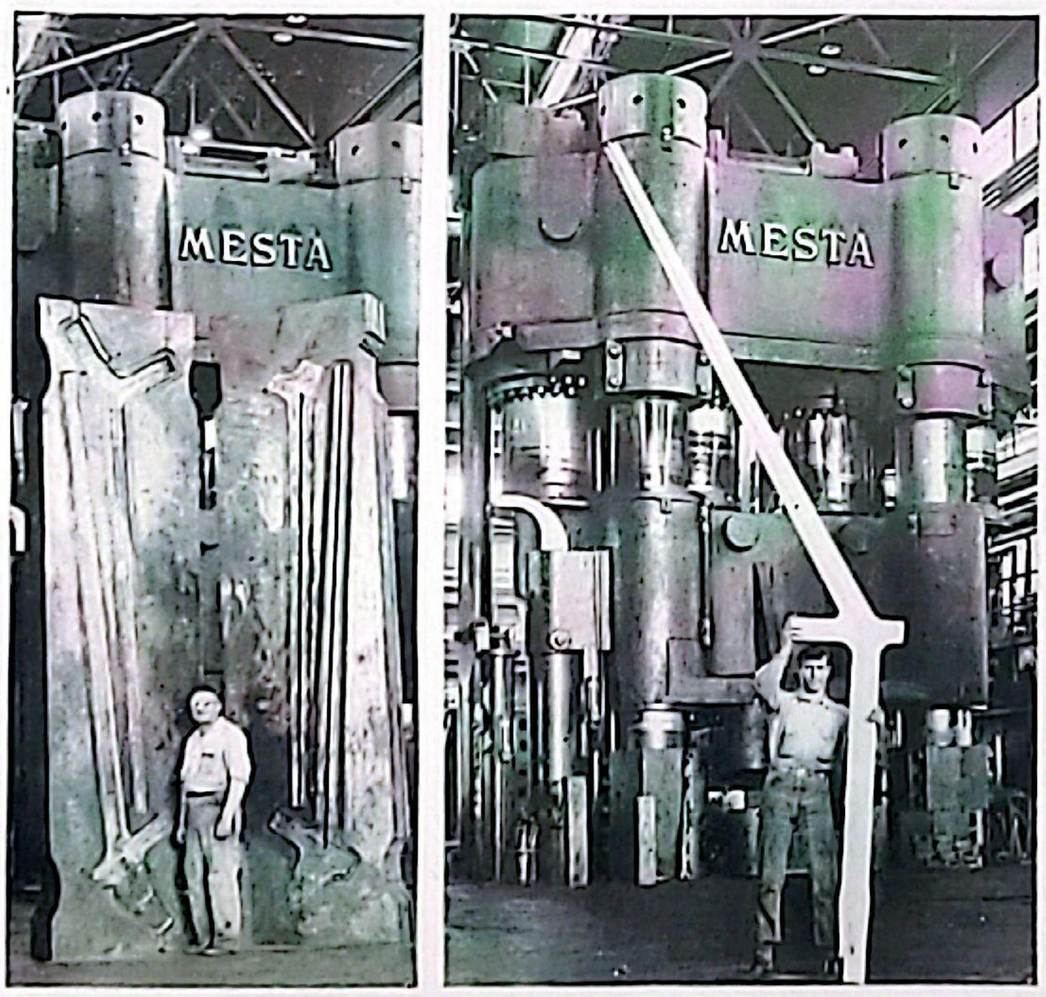
The lost years

In the U.S., for whatever reason, big presses did not look like a smart investment during the thirties. In 1944, knowledge of German forging progress finally inspired the Air Force and WPB's Aluminum and Magnesium Branch to request about $5 million of government funds for the 18,000-ton Wyman-Gordon press. The press was not finished until 1946, and then stood virtually idle, except for experimental runs, until 1948.

For nearly three years—from V-E day to the publication of the Finletter report ("Survival in the Air Age") in January, 1948—the big forging press was, for all practical purposes, forgotten. The Air Force was busy setting itself up as a separate department and trying, simultaneously, to compass the revolutionary military implications of gas turbines, rockets, and a dozen other developments. The deflated aircraft industry was designing aluminum wheelbarrows and losing money.

It was the Air Force that finally

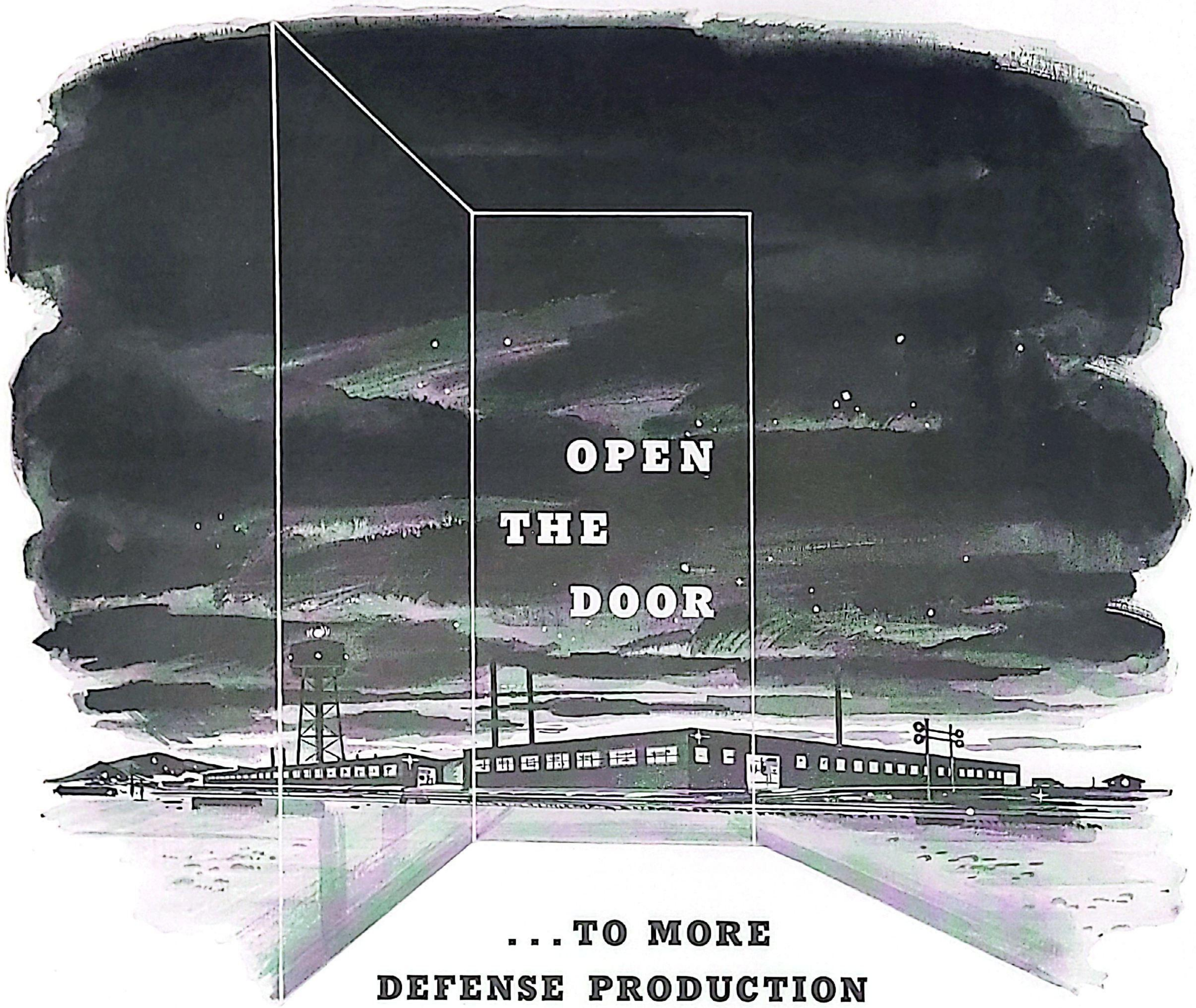
continued page 148



Biggest U.S. die-forging press is this Mesta-built, 18,000-ton machine operated by the Wyman-Gordon Co. at North Grafton, Massachusetts. Above, left, the dies used to forge the fourteen-foot wing spar; right, the longest closed-die aluminum forging ever made in the U.S. Since the spar—for an experimental bomber—was too long to fit on the press die bed, the two halves were forged separately. Note the two different sets of die cavities.

The Big Squeeze

Extrusion, like forging, improves the strength of metal by "working" it. In extrusion the "working" occurs when a billet is squeezed through a die of smaller cross section. If the die's cross section is 5.5 square inches compared to the billet's 137.5, the "deformation ration," so-called, is 1:25—a desirable value for high-strength extrusion. At this ratio, a 5.5-square-inch extrusion happens to be the biggest that can be made on existing 5,500-ton presses (if specific pressure is 40 tons per square inch). Under the same conditions, a 25,000-ton press, the largest on order, could squeeze a 625-square-inch billet down to 25 square inches. An I beam of this cross section would be none too large for heavy bombers. (Forging and extrusion require that aluminum be heated to about 800° F.)



...TO MORE
DEFENSE PRODUCTION
CAPACITY OVERNIGHT

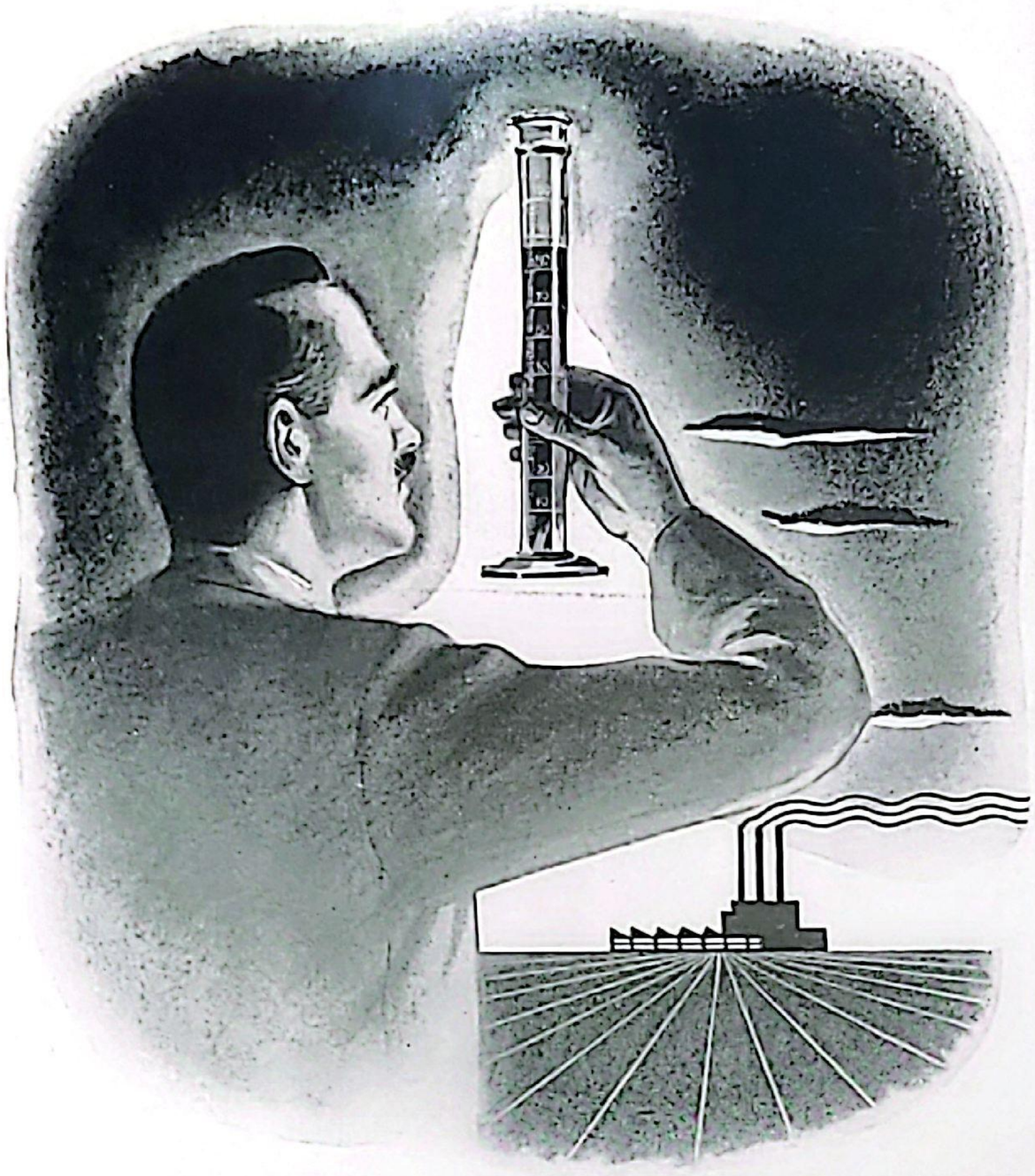
Here at Harter is a progressive, busy plant ready to go to work for you *now*. Here are the *modern* production equipment, the experienced management and the skilled labor force you want in a subcontractor. Harter offers, also, the design skill and tooling facilities needed to start actual production on your product *fast*.

Harter's reputation as the top manufacturer of quality steel office chairs and its record as a dependable subcontractor are your assurance that your order will be delivered on time and to specifications.

Write Harter Corporation or phone Sturgis 781 for complete information on Harter's metal forming and fabrication facilities. Harter Corporation, 112 Prairie Avenue, Sturgis, Michigan.

HARTER STEEL POSTURE CHAIRS

STURGIS, MICHIGAN



A TAILOR WITHOUT CLOTH

A vast gallonage moves daily from our doors . . . protective coatings, adhesives, and solvent blends. All are vital ingredients in thousands of finished products. To insure preferred performance, each gallon is *tailored* to meet precise and pre-determined standards.

Indeed, *tailored* "P&S" formulas are the very foundation of our existence . . . the very reason *you* might wisely consult this "tailor without cloth".

A booklet titled "ALL ABOUT US" will be sent if requested on your letterhead.

P&S SINCE 1884

PIERCE & STEVENS, INC., 708 Ohio Street, Buffalo 3, N. Y.

In Canada: Pierce & Stevens Canada, Ltd., Fort Erie, Ontario

LACQUERS • PROTECTIVE COATINGS • ADHESIVES • FABULON • FABULOY • SOLVENT BLENDS • REDUCERS • CLEANERS

Presses for Jets cont.

rediscovered the big press. The officer who should be given the credit is Lieutenant General Kenneth B. Wolfe, retired. During the war he had been Chief of Production for the Air Materiel Command and later Special Project Officer for the B-29 program. It was Wolfe who had sent a technical mission out after the big forging presses when Germany fell. Unfortunately, from V-J to early 1948, he was in Japan on occupation duty and the big press lacked a strong advocate.

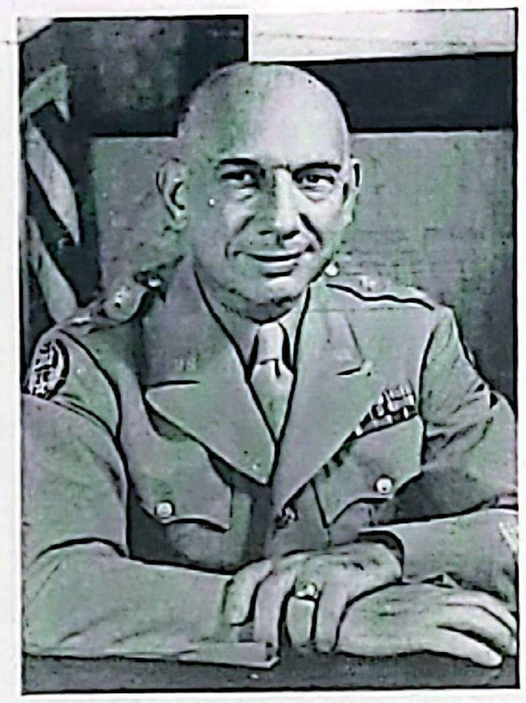
The General vs. industry

When General Wolfe was called back to the U.S. in 1948 to help carry out the industrial-mobilization recommendations of the Finletter report, he quickly launched a campaign to build a family of large presses. A little money was available and he thought he could easily line up industry support and get a program rolling. Wolfe's proposal: the Air Force would build the presses if industry would offer to take on an experimental program, redesign parts so they could be forged, and pay for the forging dies.

Industry balked on several counts. It didn't like the idea of paying for an experimental program; it said dies would be too expensive for short production runs; and it protested, finally, that it would be risky to design vital airframe members as forgings if there were only one or two presses in the U.S. that could do the job. Behind these arguments General Wolfe thought he could sense that some aircraft builders believed the whole big-press concept was impractical. Some also resented the implication that U.S. production methods were inferior to Germany's.

To strengthen his case General Wolfe gathered data to show that conventional production methods were growing so expensive that even if dies cost $50,000 they could be paid for on fairly short production runs. A B-47 compression rib, for example, cost over $8,500 to hog out. It was found that two ribs would pay for a set of dies to forge them on the 18,000-ton press. General Wolfe's final argument, however, was simple and unanswerable: if you don't begin using big presses in peacetime, you sure as hell won't be ready to use them in wartime.

Industry warmed to the idea slowly, Republic and Lockheed faster than others.* Meanwhile, the National Security Resources Board, independently in 1949, took a worried look at the U.S. lack of large forging and extrusion presses, and asked



Lieutenant General Kenneth B. Wolfe, retired (shown above as a major general), was the leading campaigner for very heavy forging presses. He is now president of Oerlikon Tool & Arms Corp., U.S. affiliate of Swiss Oerlikon.

E. V. Crane, an authority on the plastic forming of metals, to survey U.S. facilities. Crane's recommendation: immediate construction of twenty-five large forging and extrusion presses.

The upshot of the NSRB survey and the Air Force's anxiety to get moving was a series of meetings in the early summer of 1950. At these meetings, called by the Munitions Board, the original twenty-press program was agreed upon, and shortly after, the Air Force was given complete responsibility for seeing the job through.

While the Air Force undoubtedly had the most immediate need for the presses, General Wolfe and others had expected that the Army and Navy might show more interest in the program than they did. In Germany an important part of the Wehrmacht's airborne equipment was built around light-alloy forgings made on the big presses. The U.S. Army has had a piece or two forged on the 18,000-ton press, but it has not undertaken any extensive redesign of airborne weapons. The Navy's Bureau of Aeronautics has backed the press program, but other branches of the Navy have shown little interest.

There is a technological lesson in this story. Just as there are no longer many alternative ways to design so complex a mechanism as an airplane, there are no longer many alternative ways to manufacture it. The new rule emerges: function dictates not only form but manufacturing methods as well.

The story also contains a moral. There is no doubt that an inadequate military budget played a role in delaying the big press. But the role was not fundamental. No agency will ever have all the money it might like. The moral is this: it takes a few individuals with passionate convictions to buck the great inertia built into any large system, whether military or civil. END

**Republic's new F-84F, scheduled to "phase in" next year, will contain more large forgings than any other jet fighter now on order. In fact, Republic had a few anxious moments last fall when the 18,000-ton press was out of commission and it looked as if F-84F production might have to be postponed. Apparently the 16,500-ton German press at Adrian was placed in service in time to keep the plane on schedule.*

THE FINEST GIFTS OF ALL!

These Four World Famous Brands

BOLLINGER CHAMPAGNE
The Aristocrat of French Champagne

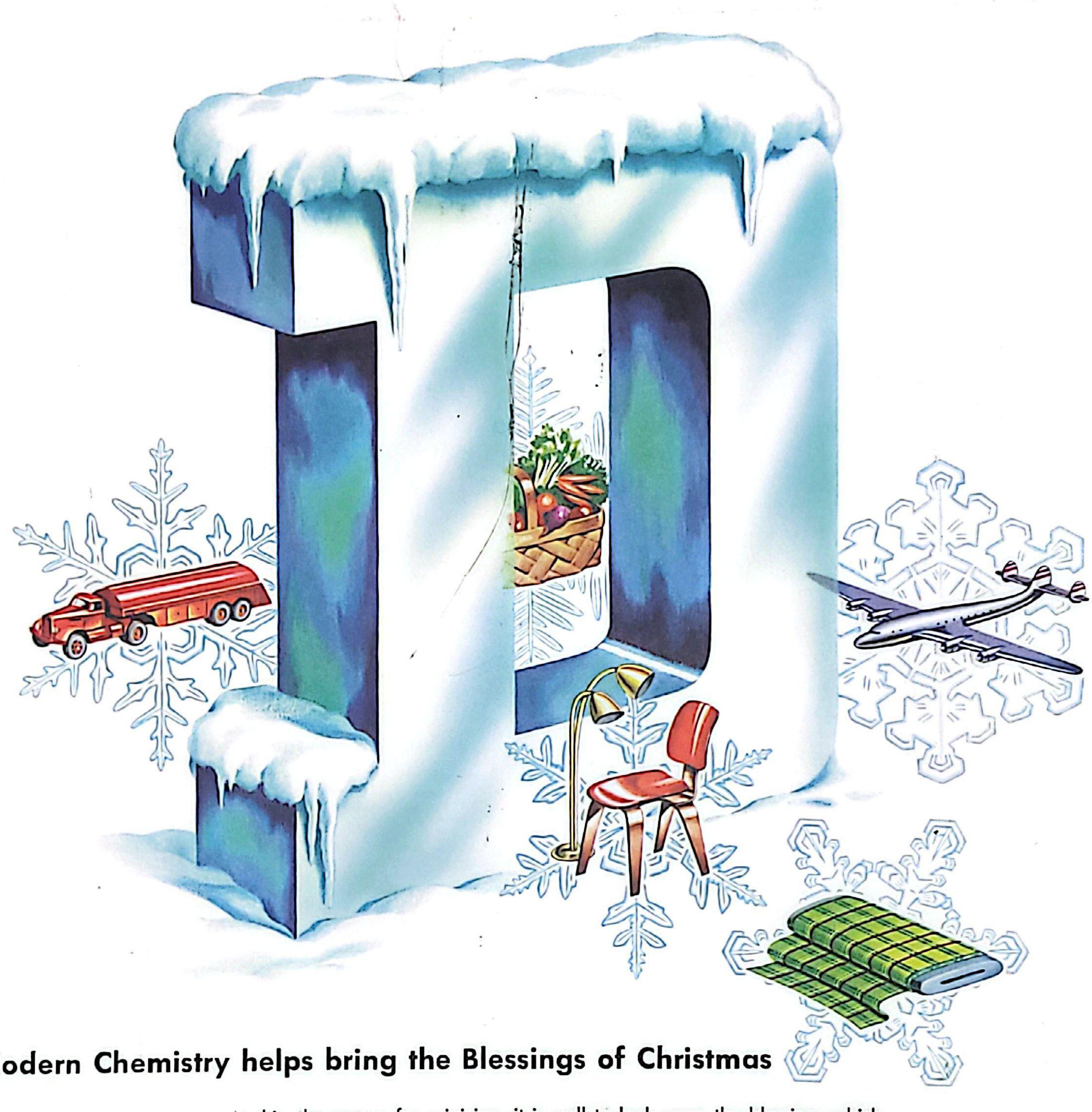
PETER DAWSON SCOTCH
The Spirit of Scotland
86.8 Proof

BENEDICTINE D.O.M
La Grande Liqueur Francaise 86 Proof

DRY SACK IN A SACK
Imported from Spain
. . . none finer

Julius Wile Sons & Co., Inc. New York, N. Y. Sole U.S. Agents · ***Let this seal be your guide to quality***

Julius WILE SONS & CO. INC. 2 PARK AVE. N.Y.
IMPORTERS SINCE 1877



Modern Chemistry helps bring the Blessings of Christmas

At this, the season for rejoicing, it is well to look upon the blessings which are ours as Americans. These blessings come in the form of new and useful products which make our lives easier, healthier, and more enriched. The chemical industry contributes importantly to this trend. The Davison Chemical Corporation, as its own business expands, has been able to evolve new products and services for many industries. The coming year promises still more developments and our book of knowledge is open to all.

"Progress through Chemistry"

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS